Robart Smith Anno 1687

A

DISCOVERY OF A New World,

OR,

A DISCOURSE Tending to prove, that 'tis Probable there may be another Habitable WORLD in the MOON.

With a Discourse Concerning the Probability of a Passage thither. Unto which is Added, A Discourse Concerning a *New Planet*, Tending to prove, That 'tis Probable Our *Earth* is one of the *Planets*.

In Two Parts.

By John Wilkins, *late Lord Bishop of* Chester.

The Fourth Edition Corrected and Amended.

LONDON,

Printed by *T. M.* & *J. A.* for *John Gillibrand* at the *Golden-Ball* in St. *Pauls* Church-Yard. MDCLXXXIV.

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THE EPISTLE TO THE READER.

IF amongſt thy Leiſure Hours, thou canſt ſpare any for the Peruſal of this Diſcourſe, and doſt look to find ſomewhat in it which may ſerve for thy Information and Benefit: let me then Adviſe thee to come unto it with an equal Mind, not ſwayed by Prejudice, but Indiffe-

rently resolved, to Assent unto that Truth which upon Deliberation shall seem most Probable unto thy Reason, and then I doubt not, but either thou wilt agree with me in this Assertion, or at least not think it to be as far from Truth, as it is from common Opinion.

Two Cautions there are which I would willingly Admonish thee of in the Begining.

1. *That thou shouldst not here look to find any Exact, Accurate Treatise, since this Discourse was but the Fruit of some Lighter Studies, and those too Hudled up in a short time, being first thought of and finished in the Space of some few Weeks, and therefore you cannot in Reason*

Expect, that it should be so Polished, as Perhaps, the Subject would Require, or the Leisure of the Author might have done it.

2. *To remember that I Promise only Probable Arguments for the Proof of this Opinion, and therefore you must not look that every Consequence, should be of an Undeniable Dependance, or that the Truth of each Argument should be Measured by its Necessity. I grant that some Astronomical appearances may Possibly be Solved otherwise than here they are. But the thing I aim at is this, that Probably they may so be Solved, as I have here set them down: Which, if it be Granted (as*

I think it must) then I doubt not, but the Indifferent Reader will find some Satisfaction in the main thing that is to be Proved.

Many Ancient Philosophers of the better Note, have formerly Defended this Assertion, which I have here laid down; and it were to be Wished, that some of us would more Apply our Endeavours unto the Examination of these Old Opinions, which though they have for a long time lien Neglected by others, yet in them may you find many Truths well worthy your Pains and Observation. 'Tis a false Conceit for us to think, that amongst the Ancient Variety and search of Opinions, the best hath still Prevailed.

Time

Time (saith the Learned Verulam) seems to be of the Nature of a River or Stream, which Carrieth down to us that which is Light or Blown up, but Sinketh that which is Weighty and Solid.

It is my Desire that by the Occasion of this Discourse, I may Raise up some more Active Spirit to a Search after other hidden and unknown Truths. Sure it must needs be a great Impediment unto the Growth of Sciences, for Men still so to Plod on upon beaten Principles, as to be afraid of Entertaining any thing that may seem to Contradict them. An unwillingness to take such things into Examination, is one of those Errours of Learning in these times

Observed

Observed by the judicious Verulam. *Questionless, there are many secret Truths, which the Antients have passed over, that are yet left to make some of our Age Famous for their Discovery.*

If by this Occasion I may Provoke any Reader to an Attempt of this Nature, I shall think my self Happy, and this Work Successful.

Farewell.

The

The Propositions that are proved in this Discourse.

PROPOSITION I.

That the strangeness of this Opinion is no Sufficient reason why it should be Rejected, because other certain Truths have been formerly esteemed ridiculous, and great Absurdities entertained by common consent. By way of Preface.

PROP. II.

That a Plurality of Worlds does not Contradict any Principle of Reason or Faith.

Prop.

PROP. III.

That the Heavens do not consist of any such pure matter which can Priviledge them from the like change and Corruption, as these Inferiour Bodies are liable unto.

PROP. IV.

That the Moon is a Solid, Compacted, Opacous Body.

PROP. V.

That the Moon hath not any Light of her own.

PROP. VI.

That there is a World in the Moon, hath been the direct Opinion of many Ancient, with some Modern Mathematicians, and may probably be deduced from the Tenents of others.

Prop.

PROP. VII.

That those Spots and brighter Parts, which by our Sight may be distinguished in the Moon, do shew the difference betwixt the Sea and Land in that other World.

PROP. VIII.

That the Spots represents the Sea; and the brighter Parts the Land.

PROP. IX.

That there are high Mountains, deep Vallies, and spacious plains in the Body of the Moon.

PROP. X.

That there is an Atmo-sphæra, or an Orb of gross Vaporous Air, immediately encompassing the Body of the Moon.

PROP. XI.

That as their World is our Moon, so our World is their Moon.

Prop.

PROP. XII.

That 'tis probable there may be such Meteors belonging to that World in the Moon, as there are with us.

PROP. XIII.

That 'tis probable there may be Inhabitants in this other World; but of what kind they are, is uncertain.

PROP. XIV.

That 'tis possible for some of or Posterity to find out a conveyance to this other World, and if there be Inhabitants there, to have Commerce with them.

The first Book.

That the MOON May be a WORLD.

The First Proposition, by way of Preface.

That the strangeness of this Opinion is no Sufficient reason why it should be rejected, because other certain Truths have been formerly esteemed ridiculous, and great Absurdities entertained by Common Consent.

THere is an Earnestness and hungering after Novelty, which doth still adhere unto all our Natures, and it is part of that Primitive Image, that wide Extent and infinite Capacity at first Created in the Heart of Man. For this,

ſince its depravation in *Adam*, perceiving it ſelf altogether Emptied of any good, doth now catch after every new Thing, conceiving that poſſibly it may find Satisfaction among ſome of its fellow Creatures. But our Enemy the Devil (who ſtrives ſtill to pervert our gifts, and beat us with our own Weapons) hath ſo contriv'd it, that any Truth doth now ſeem Diſtaſtful for that very Reaſon, for which Errour is entertain'd: Novelty. For let but ſome upſtart Hereſie be ſet abroach, and preſently there are ſome out of a curious Humour; others, as if they watched an occaſion of ſingularity, will take it up for Canonical, and make it part of their Creed and Profeſſion; whereas Solitary Truth cannot any-where find ſo ready Entertainment; but the ſame Novelty which is eſteemed the Commendation of Errour, and makes that acceptable, is counted the fault of Truth, and cauſes that to be Rejected.

How did the Incredulous World gaze at *Columbus*; when he promiſed to diſcover another part of the Earth, and he could not for a long time, by his Confidence, or Arguments, Induce any of the Chriſtian Princes, either to aſſent unto his Opinion, or go to the charges of an Experiment? Now if he, who had ſuch good grounds for his Aſſertion, could find no better Entertainment among the Wiſer ſort, and upper end of the World; 'tis not likely then that this Opinion which I now deliver, ſhall re-

receive any thing from the Men of these Days, especially our Vulgar Wits, but Misbeleif or Derision.

It hath always been the unhappiness of new Truths in Philosophy, to be derided by those that are Ignorant of the causes of things, and rejected by others, whose perverseness ties them to the contrary Opinion, Men whose Envious pride will not allow any new thing for Truth, which they themselves were not the first Inventors of. So that I may justly expect to be accused of a Pragmatical Ignorance, and bold Ostentation; especially since for this Opinion, *Xenophanes*, a Man whose Authority was able to add some Credit to his assertion, could not escape the like Censure from others. For *Natales Comes* speaking of that Philosopher, and this his Opinion, saith thus, *Nonnulli se nihil scisse videantur, aliqua nova monstra in Philosophiam introducunt, ut alicujus rei inventores fuisse appareant.* "Some there are, who lest they might seem "to know nothing, will bring up mon- "strous absurdities in Philosophy, that so "afterward they may be famed for the In- "vention of somewhat. The same Author doth also in another place accuse *Anaxagoras* of Folly for the same Opinion. *Est enim non ignobilis gradus stultitiæ, vel si nescias quid dicas, tamen velle de rebus propositis hanc vel illam partem stabilire.* "Tis "none of the worst kinds of Folly, boldly

Mytholog. lib. 3. c. 17.

Lib. 7. c. 1.

"to affirm one side or other when a Man "knows not what to say.

If these Men were thus censur'd, I may justly then expect to be derided by most, and to be beleived by few or none; especially since this Opinion seems to carry in it so much strangeness, and Contradiction to the general consent of others. But however, I am resolved that this shall not be any discouragement, since I know that it is not Common Opinion that can either add or detract from the Truth. For,

1. Other Truths have been formerly esteemed altogether as rediculous as this can be.

2. Gross absurdities have been Entertained by general Opinion.

I shall give an instance of each, that so I may the better prepare the Reader to consider things Without a prejudice, when he shall see that the Common Opposition against this which I affirm, cannot any way derogate from its Truth.

1. Other Truths have been formerly accounted as ridiculous as this. I shall specifie that of the Antipodes, which have been denied, and laught at by many wise Men and great Scholars, such as were *Herodotus*, *Chrysostom*, *Austin*, *Lactantius*, the Venerable *Bede*, *Lucretius* the Poet, *Procopius*, and the Voluminous *Abulensis*, together with all those Fathers or other Authors who denied the roundness of the Heavens. *Herodotus* counted it so horrible an absurdity, that he could

Vid. Joseph: Acosta de nat. novi Orbis lib. 1. cap. 1.

could not forbear laughing to think of it. Γελῶ δὲ ὁρῶν γῆς περιόδους γράψαντας, πολλὰς ἤδη καὶ οὐδένα νόον ἔχοντας ἐξηγησάμενον ὃ τι Ὠκιανόντε ῥεόντα γράφουσι, πέριξ πάντα γὰρ ἐοῦσαν κυκλοτερέα ὡς ἀπὸ τόρνου. "I cannot choose but laugh, "(saith he) to see so many Men Venture "to describe the Earths compass, relating "those things that are without all Sense, "as that the Sea flows about the World, "& that the Earth it self is round as an Orb. But this great Ignorance is not so much to be admired in him, as in those Learneder Men of later times, when all Sciences began to Flourish in the World. Such were St. *Chrysostome*, who in his 14 *Homily* upon the Epistle to the *Hebrews*, does make a chalenge to any Man that shall dare to defend that the Heavens are Round, and not rather as a Tent. Thus likewise St. *Austine*, who Censures that Relation of the Antipodes to be an incredible Fable; and with him agrees the Eloquent *Lactantius*, *Quid illi qui esse contrarios vestigiis nostris Antipodes putant? num aliquid loquuntur? aut est quispiam tam ineptus qui credat esse homines, quorum vestigia sunt superiora quàm capita? aut ibi quæ apud nos jacent inversa pendere? fruges & arbores deorsum versus crescere, pluvias & nives, & grandinem sursum versus cadere in terram? & miratur aliquis hortos pensiles inter septem mira narrari, quum Philosophi, & agros & maria, & urbes & Montes pensiles faciunt, &c.* "What (saith he) are they "that think there are Antipodes, such as

De civit. Dei lib. 16. *cap.* 9.

Institut. l. 3. *c.* 24.

"walk with their Feet against ours? do "they speak any likelihood? or is there "any one so foolish as to beleive that there "are Men whose Heels are higher than "their Heads? that things which with us "do lie on the ground, do hang there? "that the Plants and Trees grow down-"wards, that the Hail, and Rain, and "Snow fall upwards to the Earth? and "do we admire the hanging Orchiards a-"mongst the seven Wonders, whereas here "the Philosophers have made the Field "and Seas, the Cities and Mountains "hanging? What shall we think (saith he in *Plutarch*) that Men do cling to that place like Worms, or hang by their Claws as Cats? Or if we suppose a Man a little beyond the Center, to be digging with a Spade, is it likely (as it must be according to this Opinion) that the Earth which he loosened, should of it self ascend upwards? or else suppose two Men with their middles about the Center, the Feet of the one being placed where the Head of the other is, and so two other Men cross them, yet all these Men thus situated according to this Opinion should stand upright, and many other such gross consequences would follow (saith he) which a false Imagination is not able to fancy as possible. Upon which considerations, *Bede* also denies the being of any Antipodes, *Neque enim Antipodarum ullatenus est Fabulis accommodandus assensus.* "Nor should we any longer as-

De ratione temporum, Cap. 32.

sent

" sent to the Fable of Antipodes. So also *Lucretius* the Poet speaking of the same Subject, says,

Sed vanus stolidis hæc omnia finxerit Error. — *De nat. rerum, Lib* 1.

That some idle fancy feigned these, for Fools to beleive. Of this opinion was *Procopius Gazæus*, but he was perswaded to it by another kind of Reason; for he thought that all the Earth under us was sunk in the Water, according to the saying of the *Psalmist*, He hath founded the Earth upon the Seas; and therefore he accounted it not Inhabited by any. Nay, *Tostatus* a Man of later Years, and General Learning, doth also confidently deny that there are any such Antipodes,, though the Reason which he urges for it, be not so absurd as the former; For the Apostles, saith he, travelled through the whole habitable World, but they never passed the Equinoctial; and if you answer that they are said to go through all the Earth, because they went through all the known World, he replies, that this is not sufficent, since Christ would have all Men to be saved, and come to the knowledg of his Truth, and therefore 'tis requisite that they should have Travelled thither also, if there had been any Inhabitants; especially since he did expressly command them to go and Teach *all Nations*, and Preach the Gospel through the *whole World*,

Coment. in 1. *Cap. Gen.* Psal. 24. 2.

Coment. in 1. *Genes.* 1 Tim. 2. 4.

Mat. 28. 16 and therefore he thinks, that as there are no Men, ſo neither are there Seas, or Rivers, or any other conveniency for Habitation.

Aventinus Annal. Boiorum. lib. 3. 'Tis commonly related of one *Virgilius*, that he was Excommunicated and Condemned for a Heretick by *Zachary* Biſhop of *Rome*, becauſe he was not of the ſame Opinion. But *Baronius* ſays, it was be-

Annal. Eccleſ. A. D. 748. cauſe he thought there was another Habitable World within ours. However, you may well enough diſcern in theſe examples, how confident many of theſe great Scholars were in ſo groſs an Errour, how unlikely, what an Incredible thing it ſeemed to them, that there ſhould be any Antipodes; and yet now this Truth is as certain and plain, as Senſe or Demonſtration can make it. This then which I now deliver, is not to be rejected, though it may ſeem to contradict the common Opinion.

2. Groſs abſurdities have been entertained by general conſent. I might inſtance in many remarkable examples, but I will only ſpeak of the ſuppoſed Labour of the Moon in her Eclipſes, becauſe this is neareſt to the cheif matter in Hand, and was received as a common Opinion amongſt many of the Ancients, Inſomuch that from hence they ſtiled Eclipſes by the name of παθη *Paſſions*, or in the phraſe of the Poets,

Solis

Solis lunæq; labores.

And therefore *Plutarch* ſpeaking of a Lunary Eclipſe, relates, that at ſuch times 'twas a cuſtom amongſt the *Romans* (the moſt Civil and Learned People in the World) to Sound Braſs Inſtruments, and hold great Torches toward the Heaven. Τῶν δὲ Ῥωμαίων (ὥσπερ ἔστιν ἐνομισμένον) χαλκοῦ τε πατάγοις ἀνακαλουμένων τὸφῶς αὐτῆς καὶ πυρὰ πολλὰ δαλοῖς καὶ δασσὶν ἀνεχόντων πρὸς τὸν οὐρανὸν. For by this means they ſuppoſed the Moon was much eaſed in her Labours; and therefore *Ovid* calls ſuch loud Inſtruments the Auxiliaries or helps of the Moon, *Pa[illegible] mil.*

Cum fruſtra reſonant æra auxiliaria Lunæ. *Metam. Lib. 4.*

And therefore the Satyriſt too, deſcribing a loud Scold, ſays, She was able to make noiſe enough to deliver the labouring Moon.

Una laboranti poterit ſuccurrere Lunæ. *Juven. Sat. 6.*

Now the reaſon of all this their Cerimony, was, becauſe they feared the World would fall aſleep, when one of its eyes began to winck, and therefore they would do what they could by loud Sounds to rouſe it from its drowſineſs, and keep it awake, by bright torches, to beſtow that light upon it which it began to loſe.

Some

Some of them thought hereby to keep the Moon in her Orb, whereas otherwise she would have fallen down upon the Earth, and the World would have lost one of its Lights; for the credulous People beleived, that Inchanters and Witches could bring the Moon down, which made *Virgil* say,

Cantus & è cœlo possunt deducere Lunam.

And those Wizards knowing the times of her Eclipses, would then threaten to shew their skill, by pulling her out of her Orb. So that when the silly multitude saw that she began to look red, they presently feared they should lose the benefit of her Light, and therefore made a great noise, that she might not hear the sound of those Charms, which would otherwise bring her down; and this is rendred for a reason of this custom by *Pliny* and *Properties*:

Nat. Hist. Lib. 2c. 12: *Cantus & si curru lunam deducere tentant,*
Et facerent, si non ærea repulsa sonent.

Plutarch gives another reason of it, and he says, 'tis because they would hasten the Moon out of the dark shade wherein she was involv'd, that so she might bring away the Souls of those Saints that inhabit within her, which cry out by reason they are then depriv'd of their wonted Happiness, and cannot hear the Musick of the Spheares, but

but are forced to behold the torments and wailing of those Damned Souls which are represented to them as they are Tortured in the Region of the Air. But whether this or what ever else was the meaning of this Superstition, yet certainly 'twas a very ridiculous custom, and bewrayed a great ignorance of those ancient times; especially since it was not only received by the vulgar, such as were Men of less Note and Learning, but believed also by the more Famous and Wiser sort, such as were those great Poets, *Stesichorus* and *Pindar*. And not only amongst the more sottish Heathens, who might account that Plannet to be one of their Gods; but the Primitive Christians also were in this kind guilty, which made Saint *Ambrose* so tartly to rebuke those of of his time, when he said, *Tum turbatur carminibus Globus Lunæ, quando calcibus turbantur & oculi.* "When your Heads are "troubled with Cups, then you think the "Moon to be troubled with Charms.

And for this reason also did *Maximus* a Bishop, write a Homily against it, wherein he shewed the absurdity of that Foolish Superstition. I remember that *Ludovicus Vives* relates a more ridiculous story of a People that imprisoned an Ass for drinking up the Moon, whose Image appearing in the Water, was covered with a Cloud as the Ass was drinking, for which the poor Beast was afterward brought to the Bar to receive a Sentence according to his deserts,

Taurinensi Episc.

deſerts, where the grave Senate being ſet to examin the matter, one of the Counſel (perhaps wiſer than the reſt) riſes up, and out of his deep judgment thinks it not fit that their Town ſhould loſe its Moon, but that rather the Aſs ſhould be cut up, and that taken out of him; which Sentance being approved by the reſt of thoſe Politicians, as the ſubtileſt way for the concluſion of the matter, was accordingly performed. But whether this Tale were true or no, I will not queſtion, however, there is abſurdity enough in that former Cuſtom of the Ancients, That may confirm the Truth to be proved, and plainly declare the Inſufficiency of common opinion to add true Worth or Eſtimation unto any thing. So that from that which I have ſaid, may be gathered thus much.

1. That a new Truth may ſeem abſurd and impoſſible, not only to the Vulgar, but to thoſe alſo who are otherwiſe, Wiſe Men and Excellent Schollars; and hence it will follow, that every new thing which ſeems to oppoſe common Principles, is not preſently to be rejected, but rather to be pry'd into with a diligent enquiry, ſince there are many things which are yet hid from us, and reſerv'd for future Diſcovery.

2. That it is not the Commonneſs of an opinion that can priviledg it for a truth; the wrong way is ſometime a well beaten Path, whereas the right way (eſpecially

ally to hidden truths) may be leſs trodden and more Obſcure.

True indeed, the ſtrangneſs of this Opinion will detract much from its Credit; but yet we ſhould know that nothing is in it ſelf ſtrange, ſince every Natural Effect has an Equal dependance upon its Cauſe, and with the like neceſſity doth follow from it; ſo that 'tis our Ignorance which makes things appear ſo; and hence it comes to paſs, that many more Evident Truths ſeem incredible to ſuch who know not the cauſes of things: you may as ſoon perſwade ſome Country Peaſants, that the Moon is made of Green-Cheeſe (as we ſay) as that 'tis bigger than his Cart-Wheel, ſince both ſeem equally to contradict his ſight, and he has not reaſon enough to lead him farther than his Senſes. Nay ſuppoſe (ſaith *Plutarch*) a Philoſopher ſhould be Educated in ſuch a Secret place, where he might not ſee either Sea or River, and afterwards ſhould be brought out where one might ſhew him the great Ocean, telling him the quality of that Water, that it is brackiſh, Salt, and not Potable, and yet there were many vaſt Creatures of all Forms Living in it, which makes uſe of the Water as we do of the Air, queſtionleſs he would laugh at all this, as being Monſtrous lies, and Fables, without any Colour of Truth. Juſt ſo will this Truth, which I now deliver, appear unto others; becauſe we never Dreamt of any ſuch matter as a World in the Moon;

becauſe

because the State of that place hath as yet been vailed from our knowledg, therefore we can scarcely assent to any such matter. Things are very hardly received which are altogether strange to our Thoughts and our Senses. The Soul may with less difficulty be brought to beleive any absurdity, when as it has formerly been acquainted with some Colours and Probabilities for it; but when a new, and an unheard of Truth shall come before it, though it have good Grounds and Reasons, yet the understanding is afraid of it as a stranger, and dares not admit it into his belief, without a great deal of Reluctancy and Trial. And besides, things that are not manifested to the Senses, are not assented unto without some Labour of Mind, some Travail and discourse of the understanding; and many lazy Souls had rather quietly repose themselves in an easie Errour, than take Pains to search out the Truth. The strangeness then of this Opinion which I now deliver, will be a great hindrance to its belief, but this is not to be respected by reason it cannot be helped. I have stood the longer in the Preface, because that prejudice which the meer Title of the Book may beget, cannot easily be removed without a great deal of preparation, and I could not tell otherwise how to Rectifie the Thoughts of the Reader for an Impartial Survey of the following Discourse.

I must needs confess, though I had often thought

thought with my ſelf that it was poſſible there might be a World in the Moon, yet it ſeemed ſuch an uncouth Opinion, that I never durſt diſcover it, for Fear of being counted ſingular, and ridiculous; but afterward having read *Plutarch*, *Gallileus*, *Keplar*, with ſome others, and finding many of mine own Thoughts confirmed by ſuch ſtrong Authority, I then concluded that it was not only poſſible there might be, but probable that there was another habitable World in that Planet. In the proſecuting of this Aſſertion, I ſhall firſt endeavour to clear the way from ſuch doubts as may hinder the ſpeed or eaſe of farther progreſs; and becauſe the Suppoſitions imply'd in this Opinion, may ſeem to Contradict the Principles of Reaſon or Faith, it will be requiſite that I firſt remove this Scruple, ſhewing the conformity of them to both theſe, and proving thoſe Truths that may make way for the Reſt, which I ſhall labour to perform in the Second, Third, Fourth, and Fifth Chapters, and then proceed to conform ſuch Propoſitions, which do more directly belong to the main point in Hand.

PROP. II.

PROP. II.

That a Plurality of Worlds doth not contradict any Principle of Reason or Faith.

'TIS reported of *Aristotle*, that when he saw the Books of *Moses*, he commended them for such a Majestick stile, as might become a God, but withal, he censured that manner of Writing to be very unfitting for a Philosopher: because there was nothing proved in them, but matters were delivered, as if they would rather command, than perswade Belief. And 'tis observed that he sets down nothing himself, but he confirms it by the strongest Reason that may be found, there being scarce an Argument of force for any Subject in Philosophy, which may not be picked out of his Writings; and therefore 'tis likely, if there were in Reason a necessity of one only World, that he would have found out some such necessary proof as might confirm it: Especially since he Labours for it so much in two whole Chapters. But now all the Arguments which he himself urges in this Subject, are very weak, and far enough from having in them any convincing Power. Therefore 'tis likely that a Plurality of Worlds doth not contradict any

De Cælo l.1. c.8.9.

any Principle of reason. However, I will set down the two chief of his Arguments from his own Works, and from them you may guess the Force of the other.

The First is this, Since every Heavy Body doth naturally tend downwards, and every Light Body upwards, what a hudling and confusion must there be, if there were two places for Gravity, and two places for Lightness: for it is Probable, that the Earth of that other World would fall down to this Center, and so Mutually the Air and Fire here ascend to those Regions in the other, which must needs much derogate from the Providence of Nature, and cause a great Disorder in his Works. But *ratio hæc est minimè firma*, (saith *Zaneby*). And if you well consider the nature of Gravity, you will plainly see there is no Ground to fear any such Confusion; for Heaviness is nothing else but such a quality as causes a Propension in its Subject to tend downwards towards its own Center; so that for some of that Earth to come hither, would not be said a Fall, but an Ascension, since it moved from its own Place, and this would be Impossible (saith *Rwvio*), because against Nature, and therefore no more to be feared then the falling of the Heavens. *Ibid.* *De operibus Dei. part. 2. lib. 2. cap. 2.* *De Cælo l. 1. c. 9. q. 1.*

If you reply, that then according to this, there must be more Centers of Gravity than one; I answer, 'Tis very Probable there are, nor can we well Conceive,

what any Peice of the Moon would do being severd from the rest in the free and open Air, but only return unto it again.

Metaphys. l. 12 c. 8. Diog. Laer. lib. 3. Another argument he had from his Master *Plato*, that there is bu one World, because there is but one first Mover, God.

Infirma etiam est hæc ratio (saith *Zanchy*) and we may justly deny the Consequence, since a Plurality of Worlds doth not take away the Unity of the first Mover. *Ut enim forma substantialis, sic primum efficiens apparentem solum modo multiplicitatum induit per signatum materiam* (saith a Country-Man of ours,) As the Substantial form, so the Efficient cause hath only an appearing Multiplicity from its Particular Matter. You may see this point more Largely Handled and these Arguments more Fully answered by *Plutarch* in his Book (why Oracles are silent) and *Jacob Carpentarius* in his Comment on *Aleinous*.

Nic. Hill. de Philosop. Epic. part. 1. tic. 379.

But our opposites the Interpreters themselves, (who too often do *jurare in verba magistri*) will grant that there is not any Strength in these Consequences, and certainly then such weak Arguments could not convince that Wise Philosopher, who in his other Opinions was wont to be Swayed by the Strength and Power of Reason: wherefore I should rather think that he had some by-respect, which made him first assent to this Opinion, and afterwards strive to Prove it. Perhaps it was because

he

he feared to Displease his Scholar *Alexander*, of whom 'tis related that he Wept to hear a Disputation of another World, since he had not then attained the Monarchy of this; his restless wide Heart would have Esteemed this Globe of Earth not big enough for him, if there had been another, which made the Stayrist say of him, *Plutarch. de tranq. anim.*

Æstuat infelix angusto limite mundi. *Juvenal.*

"That he did Vex himself, and Sweat in "his desires, as being Pend up in a narrow "Room, when he was Confin'd but to one "World. Before he thought to Seat himself next the Gods: but now when he had done his best, he must be content with some Equal, or perhaps Superiour Kings.

It may be, that *Aristotle* was moved to this Opinion, that he might thereby take from *Alexander* the occasion of this Fear and Discontent; or else, perhaps *Aristotel* himself was as loth to hold the Possibility of a World which he could not discover, as *Alexander* was to hear of one which he could not Conquer. 'Tis likely that some such by-respect moved him to this Opinion, since the Arguments he urges for it, are confest by his Zealous followers and Commentators, to be very Slight and Frivolous, and they themselves grant, what I am now to Prove, that there is not any Evidence in the Light of Natural Reason, which

can sufficiently manifest that there is but one World.

But however some may Object, would it not be Inconvenient and Dangerous to admit of such Opinions that do destroy those Principles of *Aristotle*, which all the World hath so long Followed?

Apologia pro Galilæo.

This question is much controverted by some of the *Romish* Divines; *Campanella* hath Writ a Treatise in defence of it, in whom you may see many things worth the Reading and Notice.

To it I answer, That this Position in Philosophy, doth not bring any Inconvenience to the rest, since 'tis not *Aristotle*, but Truth that should be the rule of our Opinions, and if they be not both found together, we may say to him, as he said to his Master *Plato*, ἀμφοῖν τῶν ὄντων φίλων, ὅσιν προτιμᾶν τὴν ἀλήθειν. "Though *Plato* were his Friend, "yet he would rather adhere to Truth, "than him.

Ethic. l. 1. c. 6.

I must needs grant, that we are all much beholden to the industry of the Ancient Philosophers, and more especially to *Aristotle*, for the greater part of our Learning; but yet 'tis not Ingratitude to speak against him, when he opposeth Truth; for then many of the Fathers would be very Guilty, especially *Justin*, who hath writ a Treatise purposely against him.

But suppose this opinion were false, yet 'tis not against the Faith, and so it may serve for the better confirmation of that

 which

which is True; the Sparks of Errour, being forced out by Oppoſition, as the Sparks of Fire by the ſtriking of the Flint and Steel. But ſuppoſe too, that it were Heretical, and againſt the Faith, yet may it be admitted with the ſame Priviledg as *Ariſtotle*, from whom many more dangerous Opinions have proceeded: as, That the World is Eternal; That God cannot have while to look after theſe Inferiour things; That after Death there is no Reward or Puniſhment, and ſuch like Blaſphemies, which ſtrike directly at the Fundamentals of our Religion.

So that it is juſtly to be wondered, why ſome ſhould be ſo Superſtitious in theſe Days, as to ſtick cloſer unto him, than unto Scripture, as if his Philoſophy were the only Foundation of all Divine Truths.

Upon theſe Grounds, both *St. Vincentius*, and *Seraſinus de firmo*, (as I have ſeen them quoted) think, That *Ariſtotle* was the Viol of Gods Wrath, which was poured out upon the Waters of Wiſdom, by the Third Angel; But for my part, I think the World Rev. 16. 4. is much beholden to him for all its Sciences. But yet 'twere a ſhame for theſe later Ages to Reſt our Selves meerly upon the Labours of our Fore-fathers, as if they had informed us of all things to be known; and when we are ſet upon their Shoulders, not to ſee further than they themſelves did. 'Twere a Superſtitious, a lazy Opinion, to think *Ariſtotles* works the Bounds and Li-

mites of all Humane Invention, beyond which there could be no possibility of reaching. Certainly there are yet many things left to discovery, and it cannot be any inconvenience for us, to maintain a new Truth, or Rectifie an Ancient Errour.

But the position (say some) is directly against Scripture, for

1. *Moses* tells us but of one World, and his History of the Creation had been very Imperfect, if God had made another.

2. Saint *John* speaking of Gods works, says, he made the World in the singular Number, and therefore there is but one: 'tis the Argument of *Aquinas*, and he thinks that none will oppose it, but such who with *Democritus* esteem some blind Chance, and not any wise Providence to be the Framer of all things.

Part 1 *Q.* 47. *Art.* 3.

3. The Opinion of more Worlds has in Ancient times been accounted a Heresie, and *Baronius* affirms, that for this very Reason *Virgilius* was cast out of his Bishoprick, and Excommunicated from the Church.

Annal. Eccl. A.D. 748.

4. A Fourth Argument there is urged by *Aquinas*; if there be more Worlds than one, then they must either be of the same, or of a divers Nature; but they are not of the same kind; for this were needless, and would Argue an Improvidence, since one would have no more perfection than the other; not of divers kinds, for then one of them could not be called the World

Ibid.

or

or Universe, since it did not contain Universal perfection. I have cited this Argument, because it is so much stood upon by *Julius Cæsar la Galla*, one that has purposely writ a Treatise against this Opinion which I now deliver; but the Dilemma is so blunt that it cannot cut on either side, and the Consequences so weak, that I dare trust them without an Answer, And (by the way) you may see this later Author in that place, where he endeavours to prove a necessity of one World, doth leave the chief matter in Hand, and take much needless pains to dispute against *Democritus*, who thought, that the World was made by the casual concourse of *Atoms* in a great *Vacuum*. It should seem, that either his cause, or his skil was weak, or else he would have ventured upon a stronger Adversary. These Arguments which I have set down, are the chiefest which I have met with against this Subject, and yet the best of these hath not force enough to endanger the Truth that I have delivered. *De Phænom. in orbe Lunæ.*

Unto the two first, it may be answered, that the Negative Authority of Scripture, is not prevalent in those things which are not the Foundamentals of Religion.

But you'l reply, though it do not necessarily conclude, yet 'tis probable, if there had been another world, we should have had some notice of it in Scripture.

I answer, 'tis as probable that the Scrip-

cure should have informed us of the Plannets, they being very remarkable parts of the Creation; and yet neither *Moses*, nor *Job*, nor the *Psalms*, (the places most frequent in Astronomical Observations) nor any other Scripture mention any of them, but the Sun and Moon. Because the difference betwixt them and the other Stars, was known only to those who were Learned Men, and had skill in *Astronomy*. As for that expression in *Job* כוכבי בקר *the Stars of the Morning*, it is in the plural Number, and therefore cannot properly be applied to *Venus*. And for that in *Isaiah* הילל, 'tis confessed to be a word of obscure Interpretation, and therefore is but by guess Translated in that Sense. It being a true and common Rule, that *Hebræi rei sideralis minimè curiosi cœlestium nominum penuriâ laborant*. The Jews being but little skilled in Astronomy, their Language does want proper Expressions for the Heavenly Bodies, and therefore they are fane sometimes to attribute the same Name unto divers Constellations.

Job. 38. 7.

Isa. 14. 12.

Fromond. Vesta. t. 3. cap. 2.

So 2 Reg. 23. 5. חילים. Which is interpreted both for the Plannets & for the 12 signs.

Now if the Holy Ghost had intended to reveal unto us any Natural Secrets, certainly he would never have omitted the Mention of the Plannets, *Quorum motu nihil est quod de Conditoris sapientiâ testatur Evidentius apud eos qui capiunt*. Which do so Evidently set forth the Wisdom of the Creator. And therefore you must know, that 'tis besides the Scope of the Old Testament

Keplar. introduct. in Mart.

or

or the New, to discover any thing unto us concerning the Secrets of Philosophy; 'tis not his intent in the New Testament, since we cannot conceive how it might any way belong either to the Historical, Exegetical, or Prophetical parts of it; nor is it his intent in the Old Testament, as is well Observed by our Country-Man, Master *WRIGHT*, *Non Moſis aut Prophetarum inſtitutum fuiſſe videtur Mathematicas aliquas aut Phyſicas ſubtilitates promulgare, ſed ad vulgi captum & loquendi morem, quemadmodum nutrices infantulis ſolent, ſeſe accommodare.* "'Tis not the endeavour of *Moſes* or "the Prophets to discover any Mathemati- "tical or Philosophical Subtilties, but rather "to Accommodate themselves to Vulgar Ca- "pacities, and Ordinary Speech, as Nur- "ſes are wont to use their Infants. True indeed, *Moſes* is there to handle the History of the Creation. But 'tis certain (saith *Calvin*) that his purpose is to Treat only of the visible form of the World, and those parts of it, which might be most easily understood by the Ignorant and Ruder sort of People, and therefore we are not thence to expect the discovery of any Natural Secret. *Artes reconditas aliunde diſcat qui volet; hic Spiritus Dei omnes ſimul ſine exceptione docere voluit.* As for more hidden Arts, they must be looked for else-where; the Holy Ghost did here intend to instruct all without exception. And therefore 'tis Observed, That *Moſes* does not any where meddle

In Epiſt. ad Gilbert.

Calvin in 1 Gen.

meddle with such matters as were very hard to be conceived; for being to Inform the Common People, as well as others, he does it after a Vulgar way, as it is Commonly Noted, declaring the Original, chiefly of those things which are Obvious to the Sense, and being silent of other things, which then could not well be apprehended. And therefore *Pererius* proposing the question, why the Creation of Plants and Herbs is mentioned, but not of Metals and Minerals?

Com. in 1 Gen. 11.

Answers. *Quia istarum rerum generatio est vulgo occulta & ignota.* Because these things are not so commonly known as the other; and he adds, *Moses non omnia, sed manifesta omnibus enarranda suscepit. Moses* did not intend to relate unto us the beginings of all things, but those only which were most Evident unto all Men. And therefore too, *Aquinas* observes, that he writes nothing of the Air, because that being invisible, the People knew not whether there were any such Body or no. And for this very Reason, St. *Jerom* also thinks, that there is nothing expreit concerning the Creation of Angels, because the Rude and Ignorant Vulgar were not so capable of apprehending their Natures. And yet notwithstanding, these are as remarkable parts of the Creation, and as fit to be known as another World. And therefore the Holy Ghost too, uses such Vulgar Expressions, which set things forth rather as they appear, than as they

Part 1. Q. 68. Art. 3.

Epist. 139. ad Cypri. So Pererius in 2 Gen.

they are, as when he calls the Moon *one of the greater Lights*, whereas 'tis the leaſt that we can ſee in the whole Heavens. So afterwards ſpeaking of the great Rain which drowned the World; he ſays, The Windows of Heaven were opened, becauſe it ſeemed to come with that Violence, as if it were poured out from Windows in the Firmament. Gen. 1. 16. Gen. 11. Mala. 3. 10. Sir *Walter Rawly* c. 7. Sect. 6.

And in Reference to this, a drowth is deſcribed in Sundry other * places, by *the Heavens being ſhut up*. So that the Phraſes which the Holy Ghoſt ſues, concerning theſe things, are not to be underſtood in a Literal Senſe; but rather as Vulgar Expreſſions; and this Rule is ſet down by *Saint Auſtin*, where ſpeaking concerning that in the Pſalm, *who ſtretched the Earth upon the Waters*, he Notes, that when the Words of Scripture ſhall ſeem to contradict common Senſe or Experience, there, are they to be underſtood in a qualified Sence, and not according to the Letter. And 'tis obſerved, that for want of this Rule, ſome of the Ancients have faſtened ſtrange Abſurdities upon the words of the Scripture. So Saint *Ambroſe* eſteemed it a Hereſie to think that the Sun and Stars were not very Hot, as being againſt the Words of Scripture, *Pſalm.* 19. 6. where the *Pſalmiſt* ſays, that there is nothing that is hid from the Heat of the Sun. So others there are that would prove the Heavens not to be Round, out of that place, *Pſal.* 104. 2. *He ſtretched out the Hea-*

* Deut. 11. 17. 1 Reg. 3. 35. Luk. 4. 25. "

l. 2. in Gen. Pſal. 136. 6

Hexamer. lib. 2. *Item Baſil. Hom.* 3. *in Geneſ.* Wiſd. 2. 4. 17. 5. Ecclus. 43. 3, 4.

Com. in c. 1. Gen. *Heavens like a Curtain.* So *Procopius* also was of Opinion, that the Earth was Founded upon the Waters; Nay, he made it part of his Faith, proving it out of *Psal.* 24. 2. *He hath Founded the Earth upon the Seas, and Established it upon the Floods.* These and such like Absurdities have followed, when Men look for the Grounds of Philosophy in the Words of Scripture. So that, from what hath been said, I may conclude, that the silence of Scripture, concerning any other World, is not Sufficient Argument to prove that there is none. Thus for the Two first Arguments.

Unto the Third, I may Answer, That this very Example is quoted by others, to shew the Ignorance of those Primitive Times, who did somtimes condemn what they did not understand, and have often censur'd the Lawful and undoubted Parts of Mathematicks for Heretical, because they themselves could not perceive a Reason of it. And therefore their Practice, in this particular, is no Sufficient Testimony against us.

But Lastly, I answer to all the above named Objections, That the Term (*World*) may be taken in a double Sense, more Generally, for the whole Universe, as it Implies in it the Elementary and Æthereal Bodies, the Stars and the Earth. Secondly, more Particularly, for an Inferiour World consisting of Elements.

Now the main Drift of all these Argu-

ments

ments, is to confute a Plurality of Worlds in the first Sense, and if there were any such, it might, Perhaps, seem strange, that *Moses*, or St. *John* should either not Know, or not mention its Creation. And *Virgilius* was Condemned for this Opinion, because he held, *quòd sit alius mundus sub terrâ, aliusque Sol & Luna*, (as *Baronius*,) That within our Globe of Earth, there was another World, another Sun and Moon, and so he might seem to Exclude this from the Number of the other Creatures.

But now there is no such Danger in this Opinion, which is here delivered, since this World is said to be in the Moon, whose Creation is Particularly Expresst.

So that in the first Sense, I yeild, that there is but one World, which is all that the Arguments do Prove; but Understand it in the second Sense, and so I Affirm, there may be more, nor do any of the above named Objections Prove the Contrary.

Neither can this Opinion derogate from the Divine Wisdom, (as *Aquinas* thinks) but rather Advance it, shewing a *Compendium* of Providence, that could make the same Body a World, and a Moon; a World for Habitation, and a Moon for the Use of others, and the Ornament of the whole Frame of Nature. For as the Members of the Body serve not only for the Preservation of themselves, but for the Use and Convenience of the Whole, as the Hand

Hand Protects the Head as well as ſaves it Self; ſo is it in the parts of the Univerſe, where each one may ſerve as well for the Conſervation of that which is within it, as the Help of others without it.

Cuſanus de doct. ignor. l.2 c.12.

Merſennus a late Jeſuit, Propoſing the Queſtion, whether or no the Opinion of more Worlds than one, be Heretical, and againſt the Faith? He anſwers it Negatively, becauſe it does not Contradict any Expreſs place of Scripture, or Determination of the Church. And though (ſaith he) it ſeems to be a raſh Opinion, as being againſt the Conſent of the Fathers; yet, if this Contreverſie be chiefly Philoſophical, then their Authorities are not of ſuch Weight. Unto this it may be added, that the Conſent of the Fathers is Prevalent only in ſuch Points as were firſt Controverted amongſt them, and then generally decided one way, and not in ſuch other Particulars as never fell under their Examination and Diſpute.

Comment. in Gen. Qu. 19. Art. 2.

I have now in ſome Meaſure, ſhewed that a Plurality of worlds does not Contradict any Principle of Reaſon, or place of Scripture, and ſo cleared the firſt part of that Suppoſition which is implied in the Opinion.

It may next be enquired, whether 'tis poſſible there may be a Globe of Elements in that which we call the Æthereal parts of the Univerſe; for if this (as it is according to the common Opinion) be Priviledged from

from any Change or Corruption, it will be in vain then to Imagin any Element there, and if we will have another World, we must then seek out some other place for its Scituation. The Third Proposition therefore shall be this,

PROP. III.

That the Heavens do not consist of any such Pure matter, which can Priviledg them from the like Change and Corruption, as these Inferiour Bodies are Liable unto.

IT hath been often questioned amongst the Ancient Fathers and Philosophers, what kind of matter that should be, of which the Heavens are Framed. Some think that they consist of a Fifth Substance, distinct som the Four Elements, as *Aristole* holds, and with him some of the late School-Men, whose Subtil Brains could not be content to Attribute to those Vast Glorious Bodies but common Materials, and therefore they themselves had rather take Pains to prefer them to some extraordinary Nature; whereas notwithstanding, all the Arguments they could Invent, were not able to Convince a necessity of any such Matter, as is confest by their own side.

De Cœlo l. 1. c. 2.

* *Colleg. conimb. de cœlo l. 1. c. 2. q. 6. art. 3.*

side. It were much to be desired, that these Men had not in other Cases, as well as this, Multiplied things without Necessity, and as if there had not been enough to be known in the Secrets of Nature, have Spun out new Subjects from their own Brains, to find more Work for Future Ages; I shall not mention their Arguments, since 'tis already Confest, that they are none of them of any necessary Consequence: and besides you may see them set down in any of the Books *de Cœlo*.

But it is the General Consent of the Fathers, and the Opinion of *Lombard*, that the Heavens consist of the same matter with these Sublunary Bodies. St. *Ambrose* is so confident of it, that he esteems the contrary, a Heresie. True indeed, they differ much among themselves, some thinking them to be made of Fire, others of Water, and others of both; but herein they generally agree, that they are all framed of some Element or other. Which *Dionysius Carthusianus* collects from that place in *Genesis*, where the Heavens are mentioned in their Creation, as divided only in distance from the Elementary Bodies, and not as being made of any new Matter. To this purpose others Cite the Derivation of the *Hebrew* word שמים, *quasi* שם *ibi* & מים *aquæ* or *quasi* אש *ignis* & מים *aquæ*. Because they are framed out of these Elements. But concerning this, you may see sundry Discourses more at large in *Ludovicus Molina*, *Eusebius*

In Hexam. lib. 4.

Enarrat. in Genes. tit. 10.

sibius Virgilius, with divers others. The Venerable *Bede* thought the Planets to consist of all the Four Elements, and 'tis likely that the other parts are of an Aereous Substance, as will be shewed afterward, however, I cannot now stand to Recite the Arguments for either; I have only urged these Authorities to countervail *Aristotle*, and the School-Men, and the better to make way for a proof of their Corruptibility. *In opere dierum. disput.* 5. *In lib. de Mundi constit.*

The next thing then to be enquired after, is, whether they be of a Corruptible Nature, not whether they can be destroyed by God; for this, Scripture puts out of doubt. 2 Pet. 3. 12.

Nor whether or no in a long time they would wear away and grow worse; for from any such Fear they have been lately priviledged. But whether they are capable of such changes and vicissitudes, as this Inferiour World is Lyable unto? By Doctor *Hakewill. Apol. lib.* 2.

The two cheif Opinions concerning this, have both Erred in some Extremity, the one side going so far from the other, that they have both gone beyond the Right, whilst *Aristotle* hath opposed the Truth, as well as the Stoicks.

Some of the Ancients have thought, that the Heavenly Bodies have stood in need of Nourishment from the Elements, by which they were continually Fed, and so had divers Alterations by reason of their Food: this is Fathered on *Heraclitus*, followed by

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Plutarch. de plac. philos. l. 2. c. 17. that great Naturalist *Pliny*, and in general Attributed to all the Stoicks. You may see *Seneca* expressly to this purpose in these Words. *Ex illâ alimenta omnibus animalibus, omnibus satis, omnibus stellis dividuntur, Nat. Hist. l. 2. c. 9. Nat. quæst. lib. 2. c. 5.* hinc profertur quo sustineantur tot Sidera tam exercitata, tam avida per diem, noctémque, ut in opere, ita in pastu. Speaking of the Earth, he says, from thence it is that Nourishment is Divided to all the Living Creatures, the Plants and the Stars; hence were sustained so many Constellations, so Laborious, so Greedy, both Day and Night, as well in their Feeding as Working. Thus also *Lucan* Sings,

Nacmon Oceano pasci phœbúmque polumq;
Credimus.

1. *Apostel.* Unto these *Ptolomie* also that Learned Egyptian seemed to agree, when he affirms that the Body of the Moon is Moister, and Cooler than any of the other Planets, by reason of the Earthly Vapours that are exhaled unto it. You see these Ancients thought the Heavens to be so far from this Immagined Incorruptibiliy, that rather like the weakest Bodys they stood in need of some Continual Nourishment, without which they could not Subsist.

De cælo. l. 1. c. 3. But *Aristotle* and his Followers were so far from this, that they thought those Glorious Bodies could not Contain within them any such Principles as might make them

them Lyable to the least Change or Corruption; and their Chief Reason was, because we could not in so long a Space Discern any alteration amongst them; But unto this I Answer.

1. Supposing we could not, yet would it not hence Follow that there were none; as he himself in Effect doth Confess in another Place; for Speaking Concerning our knowledg of the Heavens, he says, *De cœlo l. 2 cap. 3:* 'tis very Imperfect and Difficult, by Reason of the Vast distance of those Bodies from us, and because the Changes which may Happen unto them, are not either Big enough, or Frequent enough to fall within the Apprehension and Observation of our Senses: no wonder then if he himself be Deceived in his Assertions Concerning these Particulars. But yet, in this he Implies, that if a Man were nearer to these Heavenly Bodies, he would be a fitter Judge, to decide this Controversie than himself. Now its our Advantage, that by the help of *Galileus* his Glass, we are Advanced nearer unto them, and the Heavens are made more Present to us than they were before. However, as it is with us where there be many Vicissitudes and Successions of things, though *the Earth abideth for Ever*: So likewise may it be amongst the Planets, in which tho there should be divers Alterations, yet they themselves may still Continue of the same Quantity and Light.

2. Though we could not by our Senſes ſee ſuch Alterations, yet our Reaſon might perhaps ſufficiently Convince us of them. Nor can we well Conceive how the Sun ſhould Reflect againſt the Moon, and yet not Produce ſome Alteration of Heat. *Diogenes* the Philoſopher was hence Perſwaded, that thoſe Scorching Heats had Burnt the Moon into the Form of a Pumice-Stone.

3. I anſwer, that there have been ſome Alterations Obſerved there; Witneſs thoſe Commets which have been ſeen above the Moon. As alſo thoſe Spots or Clouds that Encompaſs the Body of the Sun, amongſt which, there is a frequent Succeſſion by a Curruption of the Old, and a Generation of New. So that though *Ariſtotle*'s Conſequence were Sufficient, when he Proved that the Heavens were not Corruptable, becauſe there have not any Changes been Diſcovered in them: yet this by the ſame Reaſon muſt be as prevalent, that the Heavens are Corruptable, becauſe there have been ſo many Alterations Obſerved there; But of theſe, together with a farther Confirmation of this Propoſition, I ſhall have Occaſion to Speak afterwards; In the mean Space, I will refer the Reader to that Work of *Sheiner*, a late Jeſuit, which he Titles his *Roſa Urſina*, where he may ſee this Point concerning the Corruptibility of the Heavens, Largely Handled, and Sufficiently Confirmed.

Lib. 4. *par.* 2. *cap* 24. 35.

There

There are some other things, on which I might here take an occasion to Enlarge my self; but because they are Directly Handled by many others, and do not Immediately belong to the Chief matter in Hand, I shall therefore refer the Reader to their Authors, and Omit any large Proof of them my self, as desiring all Possible Brevity.

1. The first is this: That there are no solid Orbs. If there be a Habitable World in the Moon (which I now affirm) it must follow, that her Orb is not Solid as *Aristotle* supposed; and if not Hers, why any of the other. I rather think that they are all of a Fluid (perhaps Aereous) Substance. Saint *Ambrose*, and Saint *Basil* did endeavor to Prove this out of that Place in *Isay*, where they are compared to Smoak, as they are both Quoted by *Rhodiginus*. *Eusebius Nicrembergius* doth likewise from that Place confute the Solidity and Incorruptibility of the Heavens, and Cites for the same Interpretation the Authority of *Eustachius* of *Antioch*; and Saint *Austin*, I am sure, in one Place seems to Assent unto this Opinion, though he does often in his other Works Contradict it.

Isa. 51. 6.
Ant. lect. *l.*1. *c.* 4.
Hist. nat. *l.*2. *c.*11. 13
In lib. sup. Gen. ad lit.

If you Esteem the *Testimony* of the Ancient Fathers, to be of any great Force or Consequence in a Philosophical Dispute, you may see them to this Purpose in *Sixtus Senensis lib.* 5. *Biblioth. annot.* 14. The Chief *Reasons*, that are Commonly urged

for the Confirmation of it, are Briefly these Three.

1. From the Altitude of divers Comets, which have been Observed to be above the Planets, through whose Orbs (if they had been Solid) there would not have been any Paſſage. To theſe may be added thoſe Leſſer Planets lately diſcovered about *Jubetur* and *Saturne*, for which Aſtronomers have not yet Framed any Orbs.

2 From that uncertanty of all Aſtronomical Obſervations, which will follow upon the Suppoſition of ſuch Solid Spheres. For then we ſhould never Diſcerne any Star but by a Multitude of Refractions, and ſo Conſequently we could not Poſſible find their true Situations either in Reſpect of us, or in Regard of one another; Since what ever the Eye Diſerns by a Refracted Beam, it Apprehends to be in ſome other Place than wherein it is. But now this would be ſuch an Inconvenience, as would quite Subvert the grounds and whole Art of Aſtronomy, and therefore is by no Means to be Admitted.

Unto this it is commonly Anſwered, that all thoſe Orbs are Equally Diaphanus, though not of a Continued quantity. We reply, that Suppoſing they were, yet this cannot hinder them from being the Cauſes of Refraction, which is Produced as well by the Diverſity of Superficies, as the

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Different Perſpicuity of Bodies. Two Glaſſes put together, will cauſe a Divers Refraction from another Single one that is but of Equal Thickneſs and Perſpicuity.

3 From the Different Height of the ſame Planet at ſeveral times. For if According to the Uſual *Hypotheſis*, there ſhould be ſuch Diſtinct, Solid Orbs, then it would be Impoſſible that the Planets ſhould Intrench upon one anothers Orbs, or that two of them at ſeveral Times ſhould be above one another, which notwithſtanding hath been Proved to be ſo by Later Experience. *Tycho* hath Obſerved, that *Venus* is ſomtimes nearer than the Sun or *Mercury*, and ſomtimes farther off than both; which Appearances *Regiomontanus* himſelf does Acknowledg, and withal, does Confeſs that they cannot be Reconciled to the common *Hypotheſis*. 3

But for your Better Satisfaction herein, I ſhall Refer you to the above Named *Scheiner*, in his *Roſa Urſina*, in whom you may ſee both Authorities and Reaſon, very Largely and Diſtinctly ſet down for this Opinion. For the better Confirmation of which he adjoyns alſo ſome Authentical Epiſtles of *Fredericus Cæſius Lynceus*, a Noble Prince, written to *Bellarmine*, Containing Divers Reaſons to the ſame Purpoſe. You may alſo ſee the ſame Truth ſet down by *Johannes Pena*, in his Preface to *Euclids Opticks*, and *Chriſtoph. Rothmannus*, both who thought the Firma- *Lib.4.p.11 2.cap.7.26* 30.

ment to be only Air? and though the Noble *Tycho* do Dispute against them, yet he himself holds, *Quod propius ad veritatis penetralia accedit hæc opinio, quam Aristotelica vulgariter approbata, quæ cælum pluribus regionibus atque imperviis orbibus citra rem replevit.* That this Opinion comes nearer to the Truth, than the Common one of *Aristotle*, which hath to no purpose filled the Heavens with such real and Impervious Orbs.

De stella. 1572. l. 1. c. 9.

2. There is no Element of Fire, which must be held with this Opinion here Delivered; for if we Suppose a World in the Moon, then it will follow, that the Sphear of Fire, either is not there where 'tis usually placed in the Concavity of his Orb, or else that there is no such thing at all, which is most Probable, since there are not any such Solid Orbs, that by their swift Motion might Heat and Enkindle the adjoyning Air, which is Imagined to be the Reason of that Element. The Arguments that are Commonly Urged to this Purpose, are these.

1. That which was before alledged Concerning the Refractions which will be caused by a Different Medium. For if the Matter of the Heavens be of one Thickness, and the Element of Fire another, and the upper Region of Air Distinct from both these, and the Lower Region several from all the rest, there will then be such a Multiplicity of Refractions, as must Necessarily

Necessarily Destroy the Certainty of all Astronomical Observations. All which Inconveniences might be Avoided, by supposing (as we do) that there is but one Orb of Vapours Air which Encompasses our Earth, all the rest being *Æthereal* and of the same Perspicuity.

2. The Situation of this Element does no way agree with *Aristotles* own Principles, or that common Providence of Nature, which we may Discern in Ordinary Matters. For if the Heavens be without all Elementary Qualities, as is Usually supposed, then it would be a very Incongruous thing for the Element of Fire to be placed Immediatly next unto it: Since the Heat of this is the most Powerful and Vigorous Quality that is amongst all the rest. And Nature in her other Works, does not join Extreams, but by something of a middle Disposition. So in the very Frame of our Bodies, the Bones which are of a Hard Substance, and the Flesh of a Soft, are not joined together but by the Intercession of Membranes and Grissels, such as being of a Middle Nature may fitly come Betwixt. 2.

3. 'Tis not Conceiveable for what Use or Benefit there should be any such Element in that Place, and Certain it is, that Nature does not do any thing in Vain. 3.

4. Betwixt two Extreams there can be but one Medium, and therefore between those 4.

those two Oppoſite Elements of Earth and Water, it may ſeem more Convenient to place only the Ayr, which ſhall Partake of Middle Qualities different from both.

5 5. Fire does not ſeem ſo Properly and Directly to be Oppoſed to any thing as Ice, and if the one be not an Element, why ſhould the other?

If you Object that the Fire which we Commonly uſe, does always tend upwards. I anſwer, This cannot Prove that there is a Natural place for ſuch an Element, ſince our Adverſaries themſelves do grant that *culinary* and *elementari* Fire are of different kinds. The one does Burne, Shine, and Corrupt its Subjects; the other diſagrees from it in all theſe reſpects. And therefore from the Aſcent of the one, we cannot Properly Infer the Being or Situation of the other.

But for your farther Satisfaction herein, you may Peruſe *Cardan*; *Johannes Pena*, that Learned Frenchman, the Noble *Tycho*, with divers others who have purpoſely Handled this Propoſition.

3 3. I might add a Third, *viz.* that there is no Muſick of the Spheres; for if they be not Solid, how can their Motion cauſe any ſuch Sound as is Conceived? I do the rather Meddle with this, becauſe *Plutarch* Speaks as if a Man might very Conveniently hear that Harmony, if he were an Inhabitant in the Moon. But I gueſs that he ſaid this out of Incogitancy, and did not well Conſider thoſe Neceſſary Conſequence

quences which Depend upon his Opinion. However the World would have no great Loss in being Deprived of this Musick, unless at sometimes we had the Privilege to hear it: Then indeed *Philo* the Jew thinks it would save us the Charges of Dyet, and we might Live at an easy Rate by Feeding at the Ear only, and Receiving no other nourishment, and for this very Reason (says he) was *Moses* Enabled to tarry Forty Days and Forty Nights in the Mount without Eating any thing, because he there heard the Melody of the Heavens. —*Risum teneatis.* I know this Musick hath had great Patrons, both Sacred and Prophane Authors, such as *Ambrose*, *Beda*, *Boetius*, *Anselme*, *Plato*, *Cicero*, and others; but because it is not now, I think, Affirmed by any, I shall not therefore bestow either Pains or Time in Arguing against it. *De somniis.*

It may suffice that I have only Named these Three last, and for the two more necessary, have referred the Reader to others for Satisfaction. I shall in the next place Proceed to the Nature of the Moons Body, to know whether that be Capable of any such Conditions, as may make it possible to be Inhabited, and what those Qualities are wherein it more nearly Agrees with our Earth.

PROP.

PROP. IV.

That the Moon is Solid, Compacted, Opacous Body.

I Shall not need to stand long in the Proof of this Proposition, since it is a Truth already agreed on by the General Consent of the most, and the best Philosophers.

1. 1. It is Solid, in Opposition to Fluid, as the Aye; for how otherwise could it bear back the Light which it receives from the Sun?

But here it may be Questioned, whether or no the Moon bestow her Light upon us, by the Reflection of the Sun-beams from the Superficies of her Body, or else by her own Illumination? Some there are who Affirm this latter part. So (a) *Averroes*: (b) *Celius Rhodiginus*, (c) *Julius Cæsar*, &c. And their Reason is because this Light is Discerned in many Places, whereas those Bodies which give Light by Reflexion, can there only be perceived where the Angel of Reflexion is Equal to the Angel of Incidence, and this is only in one Place, as in a Looking-Glass, those Beams which are reflected from it, cannot be Perceived in every place where you may see the Glass, but only

a *De cælo l.2.com.49.*
b *Ant. lection. li.20. c.4.*
c *De phænom. Lunæ.c.11.*

only there where your Eye is placed on the same Line whereon the Beams are Reflected.

But to this I answer, That the Argument will not hold of such Bodies, whose Superficies, is full of Unequal parts and Gibbosities as the Moon is. Wherefore it is as well the more Probable, as the more common Opinion, that her Light Proceeds from both these Causes, from Reflexion and Illumination; nor doth it herein differ from our Earth, since that also hath some Light by Illumination: for how otherwise would the Parts about us in a Sun-shine Day appear so Bright, when as the Rays of Reflexion cannot Enter into our Eye?

For the better Illustration of this, we may Consider the several ways whereby divers Bodies are Enlightned. Either as Water, by admitting the Beams into its Substance; or as Air, and thin Clouds, by Transmitting the Rays quite thorow their Bodies; or as those things that are of an Opacous Nature, and Smooth Superficies, which Reflect the Light only in one Place; or else, as those things which are of an Opacous Nature. and Rudged Superficies, which by a kind of Circumfluous Reflexion, are at the same time Discernable in many Places, as our Earth, and the Moon.

2. It is Compact, and not a Spungey and Porous Substance. But this is Denyed by (a) *Diogenes*, (b) *Vitellio*, and (c) *Reinoldus*, and

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a *Plut. de pla. phil. l. 2. c. 13.*

b *Ope. lib. 4*

c *Com. Purbac. Theo. p.* 164.

and some others, who held the Moon to be of the same kind of Nature as a Pumice Stone; and this, say they, is the Reason why in the Suns Eclipses there Appears within her a Duskish ruddy Colour, because the Sun Beams being Refracted in passing through the Pores of her Body, must necessarily be Represented under such a Colour.

But I Reply, if this be the Cause of her Redness, then why doth she not appear under the same form when she is about a Sextile Aspect, and the Darkned part of her Body is Discernable? for then also do the same Rays pass through Her, and therefore in all likelyhood should Produce the same Effect; and notwithstanding those Beams are then Diverted from us, that they cannot enter into our Eyes by a straight Line, yet must the Colour still Remain Visible in her Body. And besides, according to this Opinion, the spots would not always be the same, but Divers as the Various distance of the Sun Requires. Again, if the Sun Beams did pass through Her, why then hath she not a Tail (saith *Scaliger*) as the Comets? why doth she Appear in such an exact Round? and not rather Attended with a Long Flame, since it is meerly this Penetration of the Sun-Beams, that is usually Attributed to be the Cause of Beards in Blasing Stars.

Scaliger Exercit. 86 *sect.* 13.

3. It is Opacous, not Transparent or Diaphanous like Crystal or Glass, as *Empedocles*

3 *Plut. de facie Lunæ.*

docles thought, who held the Moon to be a Globe of pure Congealed Ayr, like Hail incloſed in a Sphere of Fire; for then,

1. Why does ſhe not always appear in the full? ſince the Light is Diſperſed through all her Body.

2. How can the Interpoſition of her Body ſo Darken the Sun, or cauſe ſuch great Eclipſes as have turned Day into Night, that have Diſcovered the Stars, and Frighted the Birds with ſuch a ſuddain Darkneſs, that they fell down upon the Earth, as it is related in divers Hiſtories. And therefore *Herodotus* telling of an Eclipſe which fell in *Xerxes* time Deſcribes it thus ἡ ἥλιος ἐκλιπὼν τὴν ἐωυτοῦ ἐφάνη ἀφανὴς ἐών. The Sun leaving his wonted Seat in the Heavens, Vaniſhed away: all which argues ſuch a great Darckneſs, as could not have been, if her Body had been Perſpicuous. Yet ſome there are who Interpret all theſe Relations to be Hyberbolical Expreſſions; and the Noble *Tycho* thinks it Naturally Impoſſible that any Eclipſe ſhould cauſe ſuch Darkneſs, becauſe the Body of the Moon can never Totally cover the Sun. However in this he is ſingular, all other Aſtronomers (if I may belive *Keplar*) being on the Contrary Opinion, by Reaſon the Diametur of the Moon does for the moſt part appear Bigger to us than the Diametur of the Sun.

Thucid. Livij. Plut. de facie Lunæ.

Herodot. l. 7. c. 37.

Bur

De phænom. Lunæ c. 11.

But here *Julius Cæsar* once more puts in to hinder our Passage. The Moon (saith he) is not altogether Opacous, because 'tis still of the same Nature with the Heavens which are Incapable of total Opacity; and his Reason is, because Perspicuity is an Inseperable Accident of those purer Bodies; and this he thinks must Necessarily be granted; for he Stops there, and Proves no further; but to this I shall Defer an answer, till he hath made up his Argument.

We may frequently see, that her Body does so Eclipse the Sun, as our Earth doth the Moon. And besides the Mountains that are Observed there, do cast a Dark shadow behind them, as shall be shewed afterwards. Since then the like Interposition of them both, doth Produce the like Effect, they must Necessarily be of the like Natures, that is, alike Opacous, which is the thing to be shewed; and this was the Reason (as the Interpreters guess) why *Aristotle* Affirmed the Moon to be of the Earths Nature, because of their Agreement in Opacity, whereas all the other Elements, save that, are in some measure Perspicuous.

Prop. 9.

In lib. de animalib.

But, the greatest Difference which may seem to make our Earth altogether unlike the Moon, is, because the one is a Bright Body, and hath Light of its own, and the other a Grosse, Dark Body, which cannot Shine at all. 'Tis requisite therefore that in

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he next place I clear this doubt, and ſhew that the Moon hath no more light of her own than our Earth.

Propoſition. V.

That the Moon hath not any Light of her own.

IT Was the fancy of ſome of the Jews, and more eſpecially of *Rabbi Simeon*, that the Moon was nothing elſe but a Contracted Sun, and that both thoſe Plannets at their firſt Creation, were equal both in Light and quantity. For, becauſe God did then call them both great Lights, therefore they inferred that they muſt be both equal in bigneſs. But a while after (as the Tradition goes) the Ambitious Moon put up Her Complaint to God againſt the Sun, ſhewing that it was not fit there ſhould be two ſuch great Lights in the Heavens; a Monarchy woul dbeſt become the placeof Order and Harmony. Upon this, God Commanded Her to contract her ſelf into a Narrower compaſs; but ſhe being much diſcontented hereat, replies, What! becauſe I have ſpoken that which is Reaſon and Equity, muſt I therefore be diminiſh-

Toſtatus in 1 Gen. Hyeron. de Sanctafide. Hebræomaſt. l. 2. c. 4.

ed? This Sentence could not chuſe but much trouble Her; and for this Reaſon was ſhe in great diſtreſs and greif for a long ſpace, but that her Sorrow might be ſome way pacified, God bid her be of good Cheer, becauſe her Priviledges and Charter ſhould be greater than the Suns; he ſhould appear in the Day time only, ſhe both in the Day and Night; but her Melancholly being not ſatisfied with this, ſhe replied again, That that alaſs was no benefit; for in the Day time, ſhe ſhould be either not ſeen, or not noted. Wherefore, God to Comfort Her up, promiſed, that his People the Iſraelites ſhould Celebrate all their Feaſts and Holy Days by a Computation of her Months; but this being not able to Content Her, ſhe has looked very Melancholly ever ſince; however ſhe hath ſtill reſerved much light of her own.

Others there were, that did think the Moon to be a Round Globe; the one half of whoſe Body was of a bright Subſtance, the other half being dark; and the divers Converſions of thoſe ſides towards our Eyes, cauſed the Variety of her appearances: of this Opinion was *Beroſus*, as he is cited by (a) *Vitruvius*; and (b) St. *Auſtin* thought it was probable enough. But this fancy is almoſt equally abſurd with the former, and both of them found rather like Fables, than Philoſophical Truths. You may Commonly ſee how this latter does Contradict frequent and eaſie experience; for

a *Lib.* 9. *Architecturæ.*

b *Narratio Pſalmorum. item. ep.* 119.

for 'tis observed, that that spot which is perceived about her middle, when she is in the Encrease, may be discern'd in the same place when she is in the Full: whence it must follow, that the same part which was before darkened, is after inlightened, and that the one part is not always Dark, and the other Light of it self. But enough of this, I would be loth to make an Enemy, that I may afterwards overcome him, or bestow time in Proving that which is already granted, I suppose now, that neither of them hath any Patrons, and therfore need no Confutation.

'Tis agreed upon by all sides, that this Plannet receives most of her Light from the Sun; but the cheif controversie is, whether or no she hath any of her own? The greater Multitude affirm this. *Cardan* amongst the rest, is very confident of it, and he thinks that if any of us were in the Moon at the time of her greatest Eclipse, *Lunam aspiceremus non secus ac innumeris cereis splendidissimis accensis, atque in eas oculis defixis cæcutiremus*; "Wee should "perceive so great a Brightness of her own, "that would Blind us with the meer sight, "and when she is Enlightened by the Sun, "then no Eagels eye (if there were any "there) is able to look upon Her. This *Cardan* says, and he doth but say it, without bringing any Proof for its confirmation. However I will set down the Arguments that are usually urged for this

De Subtil. lib. 4.

Opinion, and they are taken either from Scripture, or Reaſon; from Scripture is urged that Place, 1 *Cor.* 15. where it is ſaid, *There is one Glory of the Sun, and another Glory of the Moon.* *Ulyſſes Albergettus* urges that in *Math.* 24. 20. οὐ σελήνη οὐ δώσει τὸ φέγγος αὐτῆς, *The Moon ſhall not give her Light*: therfore (ſays he) ſhe hath ſome of her own.

But to theſe we may eaſily Anſwer, tha the Glory and Light there ſpoken of, may be ſaid to be hers, though it be derived, as you may ſee in many other inſtances.

The Arguments from Reaſon are taken either.

1. From that Light which is Diſcerned in her, when there is a total Eclipſe of her own Body, or of the Sun.

2. From the Light which is Diſcerned in the Darker part of her Body, when ſhe is but a little Diſtant from the Sun.

1. For when there are any total Eclipſes, there appears in her Body a great redneſs, and many times Light enough to cauſe a remarkable ſhade, as common Experience doth ſufficiently manifeſt: but this cannot come from the Sun, ſince at ſuch times either the Earth or her own Body ſhades her from the Sun-Beams; therfore it muſt proceed from her own Light.

2. Two or three Days after the new Moon,

Moon, we may perceive Light in her whole Body, whereas the Rays of the Sun reflect but upon a ſmall part of that which is Viſible; therefore 'tis likely that there is ſome Light of her own.

In anſwering to theſe Objections, I ſhall firſt ſhew, that this Light cannot be her own, and then declare that which is the true Reaſon of it.

That it is not her own, appears,

1. Becauſe then ſhe would always retain it, but ſhe has been ſometimes altogether Inviſible, when as notwithſtanding ſome of the fixed Stars of the fourth or fifth Magnitude might eaſily have been diſcerned cloſe by her, As it was in the Year 1620. *Keplar. epit. Aſtron. cop. l. 6. p. 5. ſect. 2.*

2. This may appear likewiſe from the Variety of it at divers times; for 'tis commonly Obſerved that ſometimes 'tis of a Brighter, ſometimes of a Darker appearance, now Redder, and at another time of a more Duskiſh colour. The Obſervation of this variety in divers Eclipſes, you may ſee ſet down by *Keplar* and many others. But now this could not be, if that Light were her own, that being Conſtantly the ſame, and without any Reaſon of ſuch an alteration: So that thus I may argue. *Opt. Aſtron. c. 7. num. 3.*

If there were any Light proper to the Moon, then would that Plannet appear Brighteſt when ſhe is Eclipſed in her Perige being neareſt to the Earth, and ſo conſe-

quently more Obſcure and Duskiſh when ſhe is in her Apoge or fartheſt from it; the Reaſon is, becauſe the nearer any Enlightened Body comes to the Sight, by ſo much the more ſtrong are the Species and the better perceived. This ſequel is granted by ſome of our Adverſaries, and they are the very Words of Noble *Tycho*, *Si Luna genuino gauderet lumine, utiq; cum in umbra terræ eſſet, illud non amitteret, ſed eò evidentiùs exereret; omne enim lumen in tenebris, plus ſplendet cum alio majore fulgore non præpeditur.* If the Moon had any Light of her own, then would ſhe not loſe it in the Earths Shadow, but rather ſhine more Clearly; ſince every Light appears greater in the Dark, when it is not hindered by a more Perſpicuous Brightneſs.

De nova ſtella. lib. 1. c. 10.

But now the event falls out clean contrary, (as Obſervation doth manifeſt, and our Oppoſites themſelves do grant) the Moon appearing with a more reddiſh and Clear Light when ſhe is Eclipſed, being in her Apoge or fartheſt diſtance, and a more blackiſh Iron colour when ſhe is in her Perige or neareſt to us, therefore ſhe hath not any Light of her own. Nor may we think that the Earths ſhadow can cloud the proper Light of the Moon from Appearing, or take away any thing from her Inherent Brightneſs; for this were to think a ſhadow to be a Body, an Opinion altogether misbecoming a Philoſopher, as

Reinhold *Comment. in Purb. Theor pag.* 164.

as *Tycho* grants in the fore-cited place, *Nec umbra terræ corporeum quid eſt, aut denſa aliqua ſubſtantia, ut Lunæ lumen obtenebrare poſſit, atque id viſui noſtro præripere, ſed eſt quædam privatio luminis ſolaris, ob interpoſitum opacum corpus terræ.* Nor is the Earths ſhadow any Corporal thing, or thick ſubſtance, that it can cloud the Moons Brightneſs, or take it away from our Sight; but it is a meer privation of the Suns Light by Reaſon of her Interpoſition of the Earths Opacous Body.

3 If ſhe had any Light of the own, then that would in it ſelf be either ſuch a ruddy Brightneſs as appears in the Eclipſes, or elſe ſuch a Leaden duskiſh Light as we ſee in the Darker parts of her Body, when ſhe is a little paſt the Conjunction. (That it muſt be one of theſe, may follow from the Oppoſite Arguments) but it is neither of theſe; therefore ſhe hath none of her own.

1 'Tis not ſuch a ruddy Light as appears in Eclipſes; for then why can we not ſee the like redneſs, when we may diſcern the Obſcure parts of the Moon?

You will ſay, perhaps, that then the nearneſs of that greater Light takes away that Appaerance.

I Reply, this cannot be; for then why does *Mars* ſhine with his wonted Redneſs, when he is near to the Moon? or why cannot her greater Brightneſs make him appear White as the other Plannets? nor

can there be any Reaſon given why that greater Light would repreſent her Body under a falſe Colour.

2. 'Tis not ſuch a duskiſh leaden Light, as we ſee in the darker part of her Body, when ſhe is about a *Sextile* Aſpect diſtant from the Sun; for then why does ſhe appear red in the Eclipſes, ſince meer ſhade cannot cauſe ſuch Variety? for 'tis the Nature of darkneſs by its Oppoſition, rather to make things appear of a more White and clear Brightneſs than they are in themſelves, Or if it be the ſhade, yet thoſe parts of the Moon are then in the ſhade of her Body, and therefore in Reaſon ſhould have the like Redneſs. Since then neither of theſe Lights are hers, it followes that ſhe hath none of her own. Nor is this a ſingular Opinion, but it hath had many Learned Patrons; ſuch as *Macrobius*, who being for this quoted of *Rhodiginus*, he calls him *vir reconditiſſimæ ſcientiæ*, a Man who knew more than ordinary Philoſophers, thus commending the Opinion in the credit of the Author. To him aſſents the Venerable *Bede*; upon whom the Gloſs hath this Compariſon. As the Looking-Glaſs repreſents not any Image within it ſelf unleſs it receive ſome from without; ſo the Moon hath not any Light, but what is beſtowed by the Sun. To theſe agreed (a) *Albertus Magnus*, (b) *Scaliger*, (c) *Mæſtin*, *Keplar*, and more Eſpecially (d) *Malapertius*, whoſe Words are more pat to

Somn. Scip. l.1.c.20.

Lect.antiq. l.1.c.15.

In lib.de natur. rerum.

a *De 4. Coævis.Q. 4 Art.21.*

b *Exercit. 82.*

c *Epitom. Aſtron.l.4. p.2.*

d *Epit. Aſtro.Cop.l.6 part.5.ſect. 2.*

to the purpose than others, and therefore I shall set them down as you may find them in his Preface to his Treatise concerning the *Austriaca sydera; Luna, Venus, & Mercurius, terrestris & humidæ sunt substati, ideoq; de suo non lucere, sicut nec terra.* The Moon, *Venus*, and *Mercury* (saith he) are of an Earthly and moist substance, and therefore have no more Light of her own, then the Earth hath. Nay, some there are, who think, (though without Ground) that all the other Stars do receive that Light, whereby they appear Visible to us, from the Sun: so *Ptolomie*, (a) *Isidore Hispalensis*, (b) *Albertus Magnus*, and (c) *Bede*; much more then must the Moon shine with a borrowed Light.

a *Originum l.3. c: 60.*
b *De Cœlo. l. 2.*
c *De ratione tempor. c.4.*

But enough of this. I have now sufficiently shewed what at the first I Promised, that this Light is not Proper to the Moon. It remains in the next Place, that I tell you the true Reason of it. And here I think 'tis Probable that the Light which appears in the Moon at the Eclipses, is nothing else but the Second species of the Suns Rayes which pass through the shaddow unto her Body: and from a mixture of this second Light with the shadow arises that Redness which at such times appears unto us. I may call it *Lumen crepusculinum*, the *Aurora* of the moon, or such a kind of blushing Light, that the Sun causes when he is near his rising, when he bestowes some small Light upon the

Item Plinie lib: 2. ca. 6. Hugo de Sancto Victore. Arnot. in Gen. 6.

the thicker Vapours. Thus we see commonly the Sun being in the Horizon, and the Reflexion growing weak, how his Beams make the Waters appear very Red.

2 King. 3. 22. The *Moabites* in *Jehorams* time, when they Rose Early in the Morning, and beheld the Waters afar off, mistook them for Blood. *Et causa hujus est quia radius solaris in Aurora contrahit quondam rubedinem, propter vapores cambustos manentes circa superficiem terræ, per quos radii transeunt, & ideo cum repercutiantur in aqua ad oculos nostros, trahunt secum eundem ruborem, & faciunt apparere locum aquarum, in quo est repercussio, esse rubrum*, saith *Tostatus*. The Reason is, because of his Rayes, which being in the lower Vapours, those do convay an Imperfect mixed Light upon the Waters. Thus the Moon being in the Earths shadow, and the Sun Beams which are round about it, not being able to come Directly unto her Body, yet some second Rayes there are, which passing through the shadow, make her appear in that Ruddy colour: So that she must appear Brightest when she is Eclipsed, being in her Apoge or greatest Distance from us, because then the cone of the Earths shadow is less, and the Refraction is made through a narrower Medium. So on the contrary, she must be Represented under a more Dark and Obscure form when she is Eclipsed, being in her Perige or neareſt to the Earth, because then

2. *Quæst. in hoc cap.*

then ſhe is Involved in a greater ſhadow, or bigger part of the cone, and ſo the refraction paſſing through a greater Medium, the Light muſt needs be Weaker which doth proceed from it. If you ask now, what the Reaſon may be of that Light which we Diſcern in the Darker part of the New Moon? I anſwer, 'tis Reflected from our Earth, which returns as great a Brightneſs to that Plannet, as it receives from it. This I ſhall have occaſion to Prove afterward.

I have now done with theſe Propoſitions which were ſet down to clear the paſſage, and confirm the Suppoſitions implied in the Opinion; I ſhall in the next place Proceed to a more direct Treating of the chief matter in Hand.

PROP.

PROP. VI.

That there is a World in the Moon, hath been the direct Opinion of many Ancient with ſome Modern Mathematicians, and may Probably be Deduced from the Tenents of others.

SInce this Opinion may be ſuſpected of Singularity, I ſhall therefore firſt Confirm it by ſufficient Authority of divers Authors, both Ancient and Modern, that ſo I may the better clear it from the Prejudice either of an Upſtart Fancie, or an obſolete Errour. This is by ſome Attributed to *Orpheus*, one of the moſt Ancient Greek Poets. Who ſpeaking of the Moon ſayes thus, ἣ πολλ' ὄρεα ἔχει, πολλ' ἄστεα, πολλα μίλαθρα, That it hath many Mountains, and Cities, and Houſes in it. To him aſſented *Anaxagoras*, *Democritus*, and *Heraçlides*, all who, thought it to have Firm Solid Ground, like to our Earth, Containing in it many Large Fields, Champion Grounds, and Divers Inhabitants.

Plut: de plac. phil. l. 2. c. 13.

Ibid. c. 25.

Diog. Laert. l. 2. & l. 9.

Of this Opinion likewiſe was *Xenophanes*, as he is Cited for it by *Lactantius*; though that Father (perhaps) did miſtake his meaning whilſt he relates it thus, *Dixit Xenophanes, intra concavum Lunæ eſſe aliam terram*

Divin Inſt. lib. 3. c. 23.

ram, & ibi aliud genus hominum simili modo vivere sicut nos in hac terra, &c. As if he had conceived the Moon to be a great hollow Body, in the midst of whose concavity, there should be another Globe of Sea and Land, inhabited by Men, as our Earth is. Whereas it seems to be more likely by the Relation of others, that this Philosophers Opinion is to be understood in the same Sense, as it is here to be proved. True indeed, the Father Condemns this Assertion as an equall absurdity to that of *Anaxagoras*, who affirmed the Snow to be blak: but no wonder, for in the very next Chapter, it is that he does so much deride the Opinion of those who thought there were *Antipodes*. So that his Ignorance in that particular, may perhaps disable him from being a Competent Judg in any other the like point of Philosophy. Upon these agreed *Pythagoras*, who thought that our Earth was but one of the Plannets whch moved round about the Sun, (as *Aristotle* relates it of him) and the *Pythagoreans* in general did affirm that the Moon also was Terrestrial, and that she was inhabibited as this lower World; That those living Creatures and Plants which are in her, exceed any of the like kind, with us in the same Proportion, as their Days are longer than ours: *viz.* By 15. times. This *Pythagoras* was esteemed by all, of a most Divine Wit, as appears especially by his Valuation amongst the *Romans*, who being Com-

*De Cœlo. l.2.cap.*13.

Plut. ibid. cap. 30.

Commanded by the Oracle to erect a Statute to the wiſeſt *Grecian*, the Senate determined *Pythagoras* to be meant, preferring him in their Judgments before the Divine *Socrates*, whom their Gods pronounc'd the Wiſeſt. Some think him a *Jew* by Birth; but moſt agree that he was much Converſant amongſt the Learneder ſort and Prieſts of that Nation, by whom he was informed of many Secrets, and (perhaps) this Opinion which he vented afterwards in *Greece*, where he was much oppoſed by *Ariſtotle* in ſome worded Diſputations, but never confuted by any ſolid Reaſon.

Plin. Nat. Hiſt. l. 34. cap. 6.

To this Opinion of *Pythagoras* did *Plato* alſo aſſent, when he conſidered that there was the like Eclipſe made by the Earth; and this, that it had no Light of its own, that it was ſo full of ſpots. And therefore we may often read in him, and his followers, of an *æthereа terra*, and *lunares populi*, An Æthereal Earth, and Inhabiters in the Moon; but afterwards this was mixed with many ridiculous Fancies: For ſome of them conſidering the Myſteries implied in the Number 3, concluded that there muſt neceſſarily be a Trinity of Worlds, whereof the firſt is this of ours, the ſecond in the Moon, whoſe Element of Water is repreſented by the Spear of *Mercury*, the Air by *Venus*, and the Fire by the Sun. And that the whole Univerſe might the better end in Earth as it began, they have contri-

Plat. de conviviis. Macrob. Somn. Scip. lib. 1. c. 11.

ved

ved it, that *Mars* ſhall be a Sphear of the Fire, *Jupiter* of Air, *Saturn* of Water; and above all theſe, the Elyſian Fields, Spacious and Pleaſant Places appointed for the Habitation of thoſe unſpotted Souls, that either never were impriſoned in, or elſe now have freed themſelves from any Commerſe with the Body. *Scaliger* ſpeaking of this *Platonick* Fancy, *quæ in tres trientes mundum quaſi aſſem diviſit*, thinks 'tis Confutation enough, to ſay, 'tis *Plato*'s. However, for the firſt part of this Aſſertion, it was Aſſented unto by many others, and by Reaſon of the Groſſneſs and inequality of this Plannet, 'twas frequently called *quaſi terra cæleſtis*, as being Eſteemed the Sediment and more Imperfect part of thoſe purer Bodies; you may ſee this Proved by *Plutarch*, in that Delightful work which he Properly made for the Confirmation of this Particular. With him agreed *Alcinous* and *Plotinus*, later Writers.

Exercit. 62.

De facie Lunæ.

Inſtit. ad diſcp. Plat. *Cæl. Rhodig. l.1.c.4.*

Thus *Lucian* alſo in his Diſcourſe of a journey to the Moon, where though he does Speak many things out of Mirth and in a jeſting manner: yet in the Begining of it he does Intimate that it did contain ſome ſerious Truths concerning the real Frame of the Univerſe.

The Cardinal *Cuſanus* and *Fornandus Brunus*, held a particular World in every Star, and therefore one of them Defining our Earth, he ſays, it is *ſtella quædam*

Cuſa. de doct. ign. l.2 cap.12.

dam nobilis, quæ lunam & calorem & influentiam habet aliam, & diversam ab omnibus aliis ſtellis; " A Noble Star " having a diſtinct Light, Heat, and " Influence from all the reſt. Unto this *Nichol. Hill*, a Country Man of ours, was Enclined, when he ſaid *Aſtrea terræ natura probabilis eſt*: " That " 'tis Probable the Earth hath a Starry " Nature.

Philoſ. Epicur. part. 434.

But the Opinion which I have here delivered, was more directly Proved by (a) *Mæſlin*, (b) *Keplar*, and (c) *Galilæus*, each of them late Writers, and famous Men for their Singular skillin Aſtronomy. *Keplar* calls this World by the Name of *Levania* from the Hebrew Word לבנה which ſignifies the Moon, and our Earth by the name of *Volva à volvendo*, becauſe it does by Reaſon of its Diurnal Revolution appear unto them conſtantly to turn Round, and therefore he ſtiles thoſe who Live in that Hemiſphere which is towards us, by the title of *Subvolvani*, becauſe they enjoy the ſight of this Earth; and the others *Privolvani, quia ſunt privati conſpectu volvæ*, becauſe they are Deprived of this Priviledg. But *Julius Cæſar*, whom I have above Quoted, ſpeaking of their Teſtimony whom I Cite for this Opinion, *viz. Keplar* and *Galilæus*, Affirms that to his Knowledg they did but jeſt in thoſe things which they Write Concerning this, and as for any ſuch world, he Aſſuredly knows

a *In Theſibus.*
b *Diſſertatio cum Nunc.*
c *Nuncius Sydereus.*
Somn. Aſtr.

Dephænom. lunæ. c. 4.

knows they never so much as dreamt of it. But I had rather believe their own Words, than his pretended knowledg.

'Tis true indeed, in some things they do but trifle, but for the main Scope of those Discourses, 'tis as manifest they seriously meant it, as any indifferent Reader may easily discern; As for *Galilæus*, 'tis Evident that he did set down his own Judgment and Opinion in these things; otherwise, sure *Campanella* (a Man as well acquainted with his Opinion, and perhaps his Person, as *Cæsar* was) would never have writ an Apology for him. And besides, 'tis very likely if it had been but a Jest, *Galilæus* would never have suffered so much for it, as Report saith, afterwards he did.

And as for *Keplar*, I will only refer the Reader to his own words as they are set down in the Preface to the Fourth Book of his *Epitome*, where his purpose is to make an Apology for the strangeness of those Truths that he was there to deliver, amongst which, there are divers things to this purpose concerning the Nature of the Moon. He professes that he did not publish them, either out of a Humour of Contradiction, or a desire of Vain-glory, or in a Jesting way, to make himself, or others merry, but after a considerate and solemn manner, for the discovery of the Truth.

Now as for the knowledg which *Cæsar* pretends to the contrary, you may guess what it was by his strange confidence in other *cap.* 7.

Assertions, and his boldness in them may well Derogate from his Credit in this. For speaking of *Ptolome's Hypothesis*, he pronounces this Verdict, *Impossibile est excentricorum & epicyclorum positus, nec aliquis est ex Mathematicis adeo stultus, qui veram illam existimet.* "The position of *Excen-*"*tricks* and *Epicycles* is altogether impossible, "nor is there any Mathematician such a "Fool as to think it true. I should guess he could not have knowledg enough to maintain any other *Hypothesis*, who was so Ignorant in Mathematicks, as to deny, that any good Author held this. For I would fain know, whether there were never any that thought the Heavens to be Solid Bodies, and that there were such kinds of Motion, as is by those fained Orbs supplied; if so, *Cæsar la Galla* was much mistaken. I think his Assertions are equally true, that *Gallilæus* and *Keplar* did not hold this, and that there were none which ever held that other. Thus much for the Testimony of those who were directly of this Opinion.

But, in my following Discourse, I shall most insist on the Observation of *Galilæus*, the Inventor of that Famous Perspective, whereby we may discern the Heavens hard by us; whereby those things which others have formerly guest at, are manifested to the Eye, and plainly discovered beyond exception or doubt; of which admirable Invention, these latter Ages of the World may

may justly Boast, and for this, expect to be Celebrated by Posterity. 'Tis related of *Eudoxus*, that he wished himself Burnt with *Phaeton*, so he might stand over the Sun to contemplate its Nature; had he Lived in these Days, he might have enjoyed his wish at an easier Rate, and Scaling the Heavens by this glass, might plainly have discerned what he so much desired. *Keplar* considering those strange discoveries which this Perspective had made, could not choose but Cry out in a [illegible] and Rapture of Admiration, *O multiscium & quovis sceptro pretiosius perspicillum! an qui te dextrâ tenet, ille non dominus constituatur operum Dei?* And *Johannes Fabricius*, an Elegant Writer, speaking of the same glass, and for this Invention, preferring our Age before those former times of greater Ignorance, says thus; *Adeo sumus superiores veteribus, ut quam illi carminis magici pronunciatu demissam repræsentâsse putantur, nos non tantum innocenter demittamus, sed etiam familiari quodam intuitu ejus quasi conditionem intueamur.* "So "much are we above the Ancients, that "whereas they were fain by their Magical "Charms to represent the Moons ap- "proach, we cannot only bring her low- "er with a greater Innocence, but may "also with a more familiar view behold her "Condition. And because you shall have no occasion to question the Truth of those Experiments, which I shall afterwards urge from it; I will therefore set down the

De macula in sole obser.

Testimony of an Enemy, and such a witness hath always been accounted prevalent: you may see it in the above named *Cæsar la Galla*, whose words are these: *Mercurium caduceum gestantem, cælestia nunciare, & mortuorem animas ab inferis revocare sapiens finxit antiquitas. Galilæum verò novum Jovis interpretem Telescopio caduceo instructum Sydera aperire, & veterum Philosophorum manes ad superos revocare solers nostra ætas videt & admiratur.* "Wise Antiquity Fabled *Mercury* carrying a Rod in "his Hand, to relate News from Heaven, "and call back the Souls of the Dead; but "it hath been the Happiness of our industrious Age to see and admire *Galilæus*, the "New Embassiadour of the Gods, furnished "with his Perspective to unfold the Nature "of the Stars, and awaken the Ghosts of "the Ancient Philosophers. So worthily and highly did these Men esteem of this excellent Invention.

De phænom. cap. 1.

Now, if you would know what might be done by this glass, in the sight of such things as were nearer at Hand, the same Author will tell you, when he says, that by it those things which could scarce at all be discerned by the Eye, at the distance of a Mile and a half, might plainly and distinctly be perceived for 16 *Italian* Miles, and that as they were really in themselves, without any Transposition or falsifying at all. So that what the Ancient Poets were fain to put in a Fable, our more happy Age hath found

Ibid. c. 6.

out

out in a Truth, and we may discern as far with these Eyes which *Galilæus* hath bestowed upon us, as *Lynceus* could with those which the Poets attributed unto him. But if you yet doubt, whether all these Observations were true, the same Author may confirm you, when he says they were shewed, *Non uni aut alteri, sed quamplurimis, neque gregariis hominibus, sed præcipuis atque disciplinis omnibus, necnon Mathematicis & Opticis præceptis optimè instructis sedulâ ac diligenti inspectione.* cap. 1. "Not to one or two, but "to very many, and those not ordinary "Men, but to those who were well vers'd "in Mathematicks and Opticks, and that "not with a meer glance, but with a Sedu-"lous and diligent Inspection. And least any scruple might remain unanswered, or you might think the Men who beheld all this, though they might be skilful, yet they came with Credulous Minds, and so were more easie to be deluded: He adds, that it was shewed, *Viris qui ad experimenta hæc contradicendi animo accesserant.* cap. 5. "To such as "were come with a great deal of Prejudice, "and an intent of Contradiction. Thus you may see the certainty of those Experiments which were taken by this glass. I have spoken the more concerning it, because I shall borrow many things in my Farther Discourse, from those Discoveries which were made by it.

I have now Cited such Authors both Ancient and Modern, who have directly

maintained the ſame Opinion. I told you likewiſe in the Propoſition, that it might probably be deduced from the Tenents of others: ſuch were *Ariſtarchus*, *Philolæus*, and *Copernicus*, with many other later Writers, who aſſented to their Hypotheſis; ſo *Joach. Rheticus*, *David Origanus Lansbergius*, *Guil. Gilbert*, and (if I may beleive *Campanella*) *Innumeri alii Angli & Galli*, Very many others, both Engliſh and French, all who affirmed our Earth to be one of the Plannets, and the Sun to be the Center of all, about which the Heavenly Bodies did move. And how horrid ſoever this may ſeem at the firſt, yet is it likely enough to be true, nor is there any Maxime or Obſervation in Opticks, (ſaith *Pena*) that can Diſprove it.

See the Second Book. 1. Prop.

Apologia pro Galliæo.

Now if our Earth were one of the Plannets, (as it is according to them) then why may not another of the Plannets be an Earth.

Thus have I ſhewed you the Truth of this Propoſition. Before I proceed farther, 'tis requiſite that I enform the Reader, what Method I ſhall follow in the proving of this chief Aſſertion, that there is a World in the Moon.

The Order by which I ſhall be guided, will be, that which *Ariſtotle* uſes in his Book, *De mundo*, (if that Book were his.)

Firſt, περὶ τῶν ἐν αὐτῷ of thoſe chief parts which are in it; not the Elementary

tary and Æthereal, (as he doth there) since this doth not belong to the present Question, but of the Sea and Land, &c. Secondly, περὶ αὐτῶν ἐνόντων, of those things which are Extrinsecal to it, as the Seasons, Meteors, and Inhabitants.

PROP. VII.

That those Spots and brighter Parts, which by our Sight may be distinguished in the Moon, do shew the Difference betwixt the Sea and Land, in that other World.

FOR the clear proof of this Proposition, I shall first reckon up and refute the Opinions of others, concerning the matter and form of those Spots, and then shew the greater probability of this present Assertion, and how agreeable it is to that Truth, which is most commonly received; As for the Opinions of others, concerning these, they have been very many; I will only reckon up those which are Common and Remarkable.

Some there are that think those Spots do not arise from any deformity of the parts, but a deceit of the Eye, which cannot at

such a distance discern an equal Light in that Planet; but these do but only say it, and shew not any reason for the proof of their Opinion: Others think, that there are some Bodies betwixt the Sun and Moon, which keeping off the Light in some parts, do by their shadow produce these Spots which we there discern.

So *Bede* in *l. de Mund. constit.*

Others would have them to be the Figure of the Seas or Mountains, here Below: Represented there as in a Looking-Glass. But none of those Fancies can be True, because the Spots are still the same, and not Varied according to the Difference of Places; and besides, *Cardon* thinks it is Impossible that any Image should be Conveyed so far, as there to be Represented unto us, at such a Distance. But 'tis Commonly related of *Pythagoras*, that he by Writing what he pleased in a Glass, by the Reflexion of the same Species, would make those Letters to appear in the Circle of the Moon, where they should be Legible by any other, who might at that time be some Miles distant from him (a). *Agrippa* affirms this to be Possible, and the way of performing it not unknown to himself, with some others in his time. It may be, that Bishop *Godwine* did by the like means Perform those strange Conclusions, which he professes in his *Nuncius inanimatus*, where he Pretends, that he can Inform his Friends of what he pleases, though they be an Hundred Miles distant,

De subtil. lib. 3.

a *Occulta. Philos. l.* 1. *cap.* 6.

distant, *ferè stadium, vel milliare millesimum*, (they are his own Words) and perhaps, a Thousand, and all this in a Little Space, Quicker than the Sun can Move.

Now, what conveyance there should be, for so Speedy a Passage, I cannot Conceive, unless it be Carried with the Light, than which we know not any thing Quicker; But of this only by the way; however, whether those Images can be Represented so or not, yet certain it is, those Spots are not such Representations. Some think, that when God had at first Created too much Earth, to make a perfect Globe, not knowing well where to Bestow the rest, he Placed it in the Moon, which ever since hath so Darkned it in some Parts; but the Impiety of this is sufficient Confutation, since it so much Detracts from the Divine Power and Wisdom.

The (a) Stoicks held that Plannet to be mixed by Fire and Air, and in their Opinion, the Variety of its Composition caused her Spots: being not ashamed to stile the same Body a Goddess, calling it *Diana, Minerva*, &c. and yet Affirm it be an Impure Mixture of Flame, and Smoke, and Fuliginus Air.

a *Plut. de placit. phil. l.2.c.25.*

But this Plannet cannot consist of Fire (saith *Plutarch*) because their is not any Fewel to Maintain it. And the Poets have therefore fained *Vulcan* to be Lame, because

cause he can no more Subsist without Wood or other Fewell, than a Lame Man without a Staff.

Anaxagoras thought all the Stars to be of an Earthly Nature, Mixed with some Fire; and as for the Sun, he Affermed it to be nothing else but a Fiery Stone; for which latter Opinion, the *Athenians* Sentenc'd him to Death, those Zealous Idolaters counting it a great Blasphemy to make their God a Stone, whereas notwithstanding, they were so sensless in their Adoration of Idols, as to make a Stone their God. This *Anaxagoras* Affirmed the Moon to be more Terrestrial than the other Planets, but of a greater Purity than any thing here Below, and the Spots, he thought, were nothing else, but some Cloudy parts, Intermingled with the Light which belonged to that Plannet; but I have above Destroyed the Supposition on which this fancy is Grounded. *Pliny* thinks they Arise from some Drossie stuff, Mixed with that Moysture which the Moon Attracts unto her self; but he was of their Opinion, who thought the Stars were Nourished by some Earthly Vapours, which you may commonly see Refuted in the *Commentators* on the Books *de Cælo*.

Josephus l. 2. con. App. August. de civit. Dei. l. 18. c. 41.

Nat. Hist. l. 2. c. 9.

Vivellio & *Keinoldus*, Affirm the Spots to be the Thicker parts of the Moon, into which the Sun cannot Infuse much Light; and this (say they) is the Reason why in the

Opt. lib. 9. comment. in Purb. pag. 164.

the Suns Eclipſes, the Spots and Brighter Parts, are ſtill in ſome meaſure Diſtinguiſhed, becauſe the Sun Beams are not able ſo well to Penetrate through thoſe Thicker, as they may through the Thinner parts of that Plannet. Of this Opinion alſo was *Cæſar la Galla*, whoſe Words are theſe, "The Moon doth there appear Cleareſt, "where ſhe is Tranſpicious, not only "through the Superficies, but the Sub- "ſtance alſo, and there ſhe ſeems ſpot- "ted, where her Body is moſt Opacous. The ground of this his Aſſertion, was, becauſe he thought the Moon did receive and beſtow her Light by Illumination only, and not at all by reflexion; but this, together with the ſuppoſed Penetration of the Sun-Beams, and the Perſpicuity of the Moons Body, I have above Anſwered and Refuted.

Ex qua parte luna eſt tranſpicua non ſolum ſecundum ſuperficiem ſed etiam ſecundum ſubſtantiam, eatenus clara, ex qua autem parte opaca eſt, eatenus obſcura videtur. De Phænom. cap. 11. Albert. mag. de Coævis, Q. 4. Art. 21. Colleg. Con.

The more Common and general Opinion, is, that the Spots are the Thinner parts of the Moon, which are leſs able to reflect the Beams that they receive from the Sun, and this is moſt agreeable to reaſon; for if the Stars are therefore brighteſt, becauſe they are Thicker, and more Solid than their Orbs, then it will follow, that thoſe parts of the Moon which have leſs Light, have alſo leſs Thickneſs. It was the Providence of Nature (ſay ſome) that ſo contrived that Plannet to have theſe Spots within it; for ſince that is neareſt to thoſe lower Bodies which are ſo full of deformity, 'tis requi-

quiſite that it ſhould in ſome meaſure agree with them, and as in this Inferiour World, the higher Bodies are the moſt compleat, ſo alſo in the Heavens, Perfection is aſcended unto by degrees, and the Moon being the loweſt, muſt be the leaſt pure, and therefore *Philo* the Jew, Interpreting *Jacob's* Dream, concerning the Ladder, doth in an Allegory ſhew, how that in the Fabrick of the World, all things grow perfecter, as they grow higher, and this is the reaſon (ſaith he) why the Moon doth not conſiſt of any pure ſimple matter, but is mixed with Air, which ſhews ſo darkly within her Body.

De Somniis.

But this cannot be a Sufficient reaſon; for though it were true, that Nature did frame every thing perfecter, as it was higher, yet is it as true, that Nature frames every thing fully perfect for that Office to which ſhe intends it. Now, had ſhe intended the Moon meerly to reflect the Sun-Beams, and give Light, the Spots then had not ſo much argued her Providence, as her unskilfulneſs and overſight, as if in the haſt of her work, ſhe could not tell how to make that Body exactly fit, for that Office, to which ſhe intended it.

Scalig. exercit. 62.

'Tis likely then, that ſhe had ſome other end which moved her to produce this variety, and this in all probability was her intent to make it a fit Body for Habitation, with the ſame Conveniences of Sea and Land, as this Inferiour World doth partake of.

of. For since the Moon is such a Vast, such a Solid and Opacous Body, like our Earth (as was above proved) why may it not be probable, that those Thinner and Thicker parts appearing in her, do shew the difference betwixt the Sea and Land in that other World? and *Galilæus* doubts not, but that if our Earth were visible at the same distance, there would be the like appearance of it.

If we consider the Moon as another Habitable Earth, then the appearances of it will be altogether exact, and beautiful, and may argue unto that, it is fully accomplished for all those ends to which Providence did appoint it. But consider it barely as a Star or Light, and then there will appear in it much Imperfection and Deformity, as being of an Impure Dark Substance, and so unfit for the Office of that Nature.

As for the Form of those Spots, some of the Vulgar think, they represent a Man, and the Poets guess, 'tis the Boy *Endymion*, whose Company she Loves so well, that she carries him with her; others will have it only to be the Face of a Man, as the Moon is usually pictured; but *Albertus* thinks rather, that it represents a Lyon, with his Tail towards the East, and his Head the West, and * some others have thought it to be very much like a Fox, and certainly, 'tis as much like a Lyon, as that in the *Zodiake*, or as *Ursa major* is like a Bear.

* *Eusebius Nicremb. Hist. Nat. l.* 8. *c.* 15.

I should guess, that it represents one of these, as well as another, and any thing else, as well as any of these, since 'tis but a strong Imagination, which Fancies such Images, as School Boys usually do, in the marks of a Wall, whereas there is not any such Similitude in the Spots themselves, which rather like our Sea, in respect of the Land, appears under a Rugged and Confused Figure, and doth not represent any distinct Image, so that both in respect of the matter, and the Form, it may be probable enough, that those Spots and brighter parts, may shew the distinction betwixt the Sea and Land, in that other World.

PROP.

PROP. VIII.

The Spots repreſent the Sea, and the brighter Parts the Land.

WHen I firſt compared the Nature of our Earth and Water, with thoſe appearances in the Moon; I concluded contrary to the Propoſition, that the brighter Parts repreſented the Water, and the Spots the Land; of this Opinion likewiſe was *Keplar* at the firſt. But my ſecond Thoughts, and the reading of others, have now convinced me (as after he was) of the Truth of that Propoſition which I have now ſet down. Before I come to the Confirmation of it, I ſhall mention thoſe Scruples, which at firſt made me doubt the Truth of this Opinion. *Opt: Aſtro. c.6.num.9. Diſſert. cum nuncio Gal.*

1. It may be Objected, 'tis Probable, if there be any ſuch *Sea* and Land as ours, that it bears ſome Proportion and Similitude with ours, but now this Propoſition takes away all Likeneſs betwixt them. For whereas the Superficies of our Earth is but the Third part of the whole Surface in the Globe, Two Parts being overſpread with the Water (as *Scaliger* *Exercit.* 39.

Ob-

obſerves) yet here, according to this Opinion, the Sea ſhould be leſs than the Land, ſince there is not ſo much of the Beſpoted, as there is of the Enlightened parts, wherefore 'tis Probable, that there is no ſuch thing at all, or elſe, that the Brighter parts are the Sea.

2. The Water, by Reaſon of the Smoothneſs of its Superficies, ſeems better able to Reflect the Sun-Beams than the Earth, which in moſt Places is ſo full of Ruggedneſs of Graſs and Trees, and ſuch like Impediments of Reflexion; and beſides, common Experience ſhews, that the Water Shines with a greater and more Glorious Brightneſs than the Earth; therefore it ſhould ſeem that the Spots are the Earth, and the Brighter parts the Water. But to the Firſt it may be Anſwered.

1. There is no great Probability in this Conſequence, that becauſe 'tis ſo with us, therefore it muſt be ſo with the parts of the Moon, for ſince there is ſuch a Difference betwixt them in Divers other Reſpects, they may not perhaps Agree in this.

De Meteoris l. 5. *c.* 1. *Art.* 1.

2. That Aſſerſion of *Scaliger* is not by all Granted for a Truth. *Fromundus*, with others, think, that the Superficies of the Sea and Land, in ſo much of the World as is already Diſcovered, is equal, and of the ſame Extenſion.

3. The Orbe of Thick and Vaporous Air

Air which Incompaſes the Moon, makes the Brighter parts of that Plannet appear Bigger than in themſelves they are; as I ſhall ſhew afterwards.

To the Second it may be Anſwered, that though the Water be of a ſmooth Superficies, and ſo may ſeem moſt fit to Reverberate the Light, yet becauſe 'tis of a Prefpecuous Nature, therefore the Beams muſt Sink into it, and cannot ſo Strongly and Clearly be Reflected. *Sicut in ſpeculo ubi plumbum abraſum fuerit*, (ſaith *Cardan*) as in Looking-Glaſſes where part of the Lead is Razed off, and nothing left behind to Reverberate the Image, the Species muſt there paſs through and not Back again, ſo it is where the Beams Pennetrate and Sink into the Subſtance of the Body, there cannot be ſuch an Immediate and ſtrong Reflexion, as when they are Beat back from the Superficies, and therefore the Sun cauſes a greater Heat by far upon the Land than upon the Water. Now as for that Experiment where it is ſaid, that the Waters have a greater Brightneſs than the Land: I Anſwer, 'tis true only there where they Repreſent the Image of the Sun or ſome Bright Cloud, and not in other places, Eſpecially if we look upon them at any great Diſtance, as is very Plain by common Obſervation.

And 'tis certain that from any high Mountain the Land does appear a great

deal Brighter than any Lake or River.

This may yet be farther Illuſtrated by the Similitude of a Looking-Glaſs hanging upon a Wall in the Sun-ſhine, where, if the Eye be not placed in the juſt line of Reflexion from the Glaſs, 'tis Manifeſt that the Wall will be of a Brighter Appearance than the Glaſs. True indeed in the Line of Reflexion, the Light of the Glaſs is Equal almoſt unto that which comes Immadiately from the Sun it ſelf; but now this is only in one Particular place, and ſo is not like that Brightneſs which we Diſcern in the Moon, becauſe this does Appear Equally in ſeveral Scituations, like that of the Wall which does ſeem Bright as well from every place as from any one. And therefore the Ruffineſs of the Wall, or (as it is in the Objection) the Ruggedneſs of our Earth is ſo far from being an hinderance of ſuch a Reflexion as there is from the Moon, that it is rather Required as a Neceſſary Condition unto it. We may conceive that in every rough Body there are, as it were, innumberable Superficies, Diſpoſed unto an Innumerable Diverſitie of Inclinations. *Ita ut nullus ſit locus; ad quem non pertingant plurimi radii reflexi a plurimis ſuperficieculis, per omnem corporis ſcabri radiis luminoſis percuſſi ſuperficiem diſperſis.* "So that there is not "any place unto which there are not ſome "Beams Reflected from theſe Divers Super-"ficies, in the ſeveral parts of ſuch a "rugged Body. But yet (as I ſaid be-fore)

Galilæus Syſtem. coll. 1.

fore) the Earth does Receive a great part of its Light by Illumination, as well as by Reflexion.

So that notwithstanding those Doubts, yet this Proposition may remain True, that the Spots may be the Sea, and the Brighter parts the Land. Of this Opinion was *Plutarch*: unto him Assented *Kepler* and *Galileus*, whose words are these, *Si quis veterum Pythagoreorum sententiam excitare velit, dicam scilicet esse quasi tellurem alteram, ejus pars lucidior terrenam superficiem, obscurior vero aqueam magis congruè repræsentet. Mihi autem dubium fuit nunquam terrestris globi à longe conspecti, atque a radiis solaribus perfusi, terream superficiem clariorem, obscuriorem vero aqueam esse in conspectum daturam.* "If any Man have "a mind to Renew the Opinion of the Py- "thagoreans, that the Moon is another "Earth, then her Brighter parts may fitly "Represent the Earths Superficies, and "the Darker part the Water: and for my "part, I never Doubted but that our "Earthly Globe being Shined upon by the "Sun, and beheld at a great Distance, "the Land would appear Brighter, and the "Sea more Obscurely. The Reasons may be.

1. That which I urged about the foregoing Chapter, because the Water is the Thinner part, and therefore must give less Light.

De facie lun. Dissertatio Nunc. Syd. Kepler

Since the Stars and Planets, by Reason of their Brightness, are Usually con-

concluded to be the Thicker parts of her Orb.

In lib. de coloribus.

2. Water is in it self of a Blacker Colour (saith *Aristotle*) and therefore more Remote from Light than the Earth. Any parts of the Ground being Moistned with Rain, does Look much more Darkly than when it is Dry.

3. 'Tis Observed that the Secondary Light of the Moon (which afterwards is Proved to Proceed from our Earth) is Sensibly Brighter unto us, for two or three Dayes before the Conjunction, in the Morning when she Appears Eastward, than about the same time after the Conjunction, when she is seen in the West. The Reason of which must be this, because that part of the Earth which is Opposite to the Moon in the East, has more Land in it than Sea. Whereas on the Contrary, the Moon when she is in the West, is Shined upon by that part of our Earth where there is more Sea than Land, from whence it will follow with good Probability that the Earth does cast a greater Light than the Water.

4. Because Observation tells us, that the Sported parts are always Smooth and Equal, having every where an Equality of Light when once they are Enlightned by the Sun, whereas the Brighter parts are full of rugged Gibbosities and Mountains, having many Shades in them, as I shall shew more at Large afterwards.

That in this Plannet there must be Seas, *Campanella* Indeavours to prove out of Scripture, Interpreting *the Waters above the Firmament* Spoken in *Genesis*, to be meant of the Sea in this World. For (saith he) 'tis not likely that there are any such Waters above the Orbs to Moderat that Heat which they receive from their Swift Motion (as some of the Fathers think.) Nor did *Moses* mean the Angels which may be called Spiritual Waters, as *Origen* and *Austin* would have it, for both these are Rejected by the General consent: Nor could he mean any Waters in the second Region, as most Commentators Interpret it, For first, there is nothing but Vapours, which though they are afterwards turned into Water, yet while they Remain there, they are only the Matter of that Element, which may as well be Fire, or Earth, or Air. Secondly, Those Vapours are not above the Expansum, but in it. So that he thinks there is no other way to salve all, but by making the Plannets several Worlds with Sea and Land, with such Rivers and Springs as we have here below: Especially since *Esdras* Speaks of the Springs above the Firmament. But I cannot agree with him in this, nor do I think that any such thing can be Proved out of Scripture.

Apologia pro Galilæo.

Vide. Ieron. Epist. ad Pammachium. *Confession. l. 13. c. 32. Retracted. lib. 2. Retr. cap. 6.*

2 Esdr. 4. 7

Before I Proceed to the next Position, I shall first Answer some Doubts which might be made against the Generality of

this Truth, whereby it may seem Impossible that there should be either Sea or Land in the Moon; for since she moves so Swiftly as Astronomers Observe, why then does there nothing Fall from her, or why doth she not Shake something out by the Celerity of her Revolution; I Answer, you must know that the Inclination of every heavy Body to its Proper Center, doth Sufficiently tie it unto its Place; so that Suppose any thing were Separated, yet must it Necessarily return again. And there is no more Danger of their Falling into our World, than there is Fear of our Falling into the Moon.

But yet there are many Fabulous Relations of such things as have Dropped thence. There is a Tale of the Nemean Lyon that *Hercules* Slew, which first Rustling among the Heards out of his unknown Den in the Mountain of *Cytheron* in *Bœotia*, the Credulous People thought he was sent from their Goddess the Moon. And if a Whirl-Wind did chance to Snatch any thing up, and afterwards Rain it Down again, the Ignorant Multitude were apt to beleive that it Dropt from Heaven. Thus *Avicenna* relates the Story of a Calf which fell down in a Storm, the beholders thinking it a Moon-Calf, and that it fell thence. So *Cardan* Travelling upon the Apennine Mountains, a sudden Blast took off his Hat, which if it had been carryed

Vide Gult: Nubrigens. de rebus Anglicæ: lib. 1.

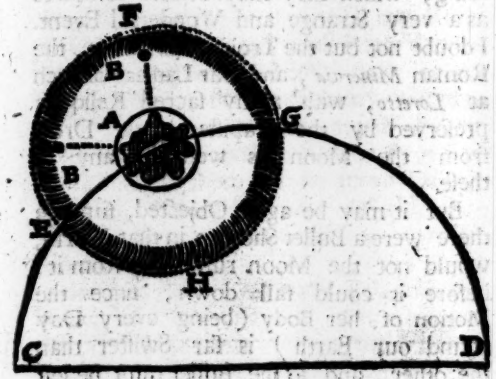
ryed far, he thinks the peasants, who had perceived it to Fall, would have Sworn it had Rained Hats. After some such Manner, many of our Prodigies come to Pass, and the People are willing to beleive any thing, which they may Relate to others as a very Strange and Wonderful Event. I doubt not but the Trojan *Palladium*, the Roman *Minerva*, and our Ladies Church at *Loretto*, with many sacred Reliques preserved by the Papists might Drop from the Moon as well as any of these.

But it may be again Objected, suppose there were a Bullet Shot up in that World, would not the Moon run away from it, before it could fall down, since the Motion of her Body (being every Day round our Earth) is far Swifter than the other, and so the Bullet must be left behind, and at Length fall down to us? To this I Answer.

1. If a Bullet could be Shot so far till it came to the Circumference of those things which belong to our Center, then it would fall down to us.

2. Though there were some Heavy Body a great Height in that Air, yet would the Motion of that Magnetical Globe to which it did belong by an attractive Vertue still hold it within its Convenient distance, whether their Earth Moved or stood Stil, yet would the same Violence cast a Body from it Equally

far. That I may the plainer Expreſs my meaning, I will ſet down this Diagramme.



Suppoſe this Earth were A, which was to Move in the Circle C. D. and let the Bullet be Suppoſed at B. within its Proper Verge; I ſay, whether this Earth did Stand ſtill or Move Swiftly towards D, yet the Bullet would ſtill keep at the ſame Diſtance by reaſon of that Magnetick Vertue of the Center (if I may ſo *Speak*) whereby all things within its Sphear are Attracted with it. So that the Violence to the Bullet, being nothing elſe but that where-

whereby 'tis Removed from its Center, therefore an equal Violence can Carry a Body from its Proper place, but at an equal Distance, whether or no this Earth where its Center is, does Stand ſtill or Move.

The Impartial Reader may find ſufficient Satisfaction for this and ſuch other Arguments as may be Urged againſt the Motion of that Earth, in the Writings of *Copernicus* and his followers, unto whom, for Brevities ſake, I will Refer them.

PROP.

PROP. IX.

That there are high Mountains, deep Vallies, and Spacious Plains in the Body of the Moon.

THough there are some, who think Mountains to be a Deformity to the Earth, as if they were either Beat up by the Flood, or else Cast up like so many Heaps of Rubbish left at the Creation; yet if well Considered, they will be found as much to Conduce to the Beauty and Conveniency of the Universe, as any of the other Parts. Nature (saith *Pliny*) Purposely framed them for many Excellent Uses: partly to Tame the Violence of greater Rivers, to strengthen certain joynts within the Veins and Bowels of the Earth, to break the Force of the Seas Inundation, and for the safety of the Earths Inhabitants, whether Beasts or Men. That they make much for the Protection of Beasts, the Psalmist testifies,

The

The high Hills are a refuge for the wild Goats, and the Rocks for the Conies. Psal. 104. v. 18. The Kingly Prophet had likewise Learned the Safety of these by his own Experience, when he also was Fain to make a Mountain his Refuge from the Fury of his Master *Saul*, who Persecuted him in the Wilderness.

True indeed, such places as these keep their Neighbours poor, as being most Barren, but yet they preserve them safe, as being most strong; witness our unconquered *Wales* and *Scotland*, whose greatest Protection hath been the Natural Strength of their Country, so Fortified with Mountains, that these have always been unto them, sure Retreits from the Violence and Oppression of others. Wherefore a good Author doth Rightly call them Natures Bul-warks, cast up at God Almighties own charges, the Scorns and Curbs of Victorious Armies; which made the Barbarians in *Curtius* so confident of their own safety, when they were once retired to an inaccessible Mountain, that when *Alexanders* Legate had brought them to a Parley, and perswading to yeild, told them of his Masters Victories, what Seas and Wildernesses he had passed; they replied, that all that might be, but could *Alexander* Fly too? Over the Seas he might have Ships, and over the Land Horses, but he must have Wings before he could get up thither. Such safety did those Barbarous Nations conceive

ceive in the Mountains whereunto they were retired. Certainly then such useful parts were not the Effect of Mans Sin, or produced by the Worlds Curse, the Flood, but rather at the first Created by the Goodness and Providence of the Almighty.

This Truth is usually concluded from these and the like Arguments.

1. Because the Scripture it self, in the Description of that general Deluge, tells us, it overflowed the highest Mountains.

2. Because *Moses* who writ long after the Flood, does yet give the same Description of Places and Rivers, as they had before; which could not well have been if this had made so strange an Alteration.

3. 'Tis Evident that the Trees did stand as before. For otherwise *Noah* could not so well have concluded, that the Waters were abated, from this reason, because the Dove brought an Olive Leaf in her Mouth, when she was sent forth the Second time: whereas had the Trees been rooted up, she might have taken it the first time, from one of them as it was Floating on the Top of the Waters. Now if the Motion of the Water was not so Violent as to Subvert the Trees, much less was it able to cast up such vast heaps as the Mountains.

4. When the Scripture doth set forth unto us the Power and Immensity of God by the Variety or Usefulness of the Creatures which

which he hath made, amongst the rest it doth often mention the Mountains. *Psal.* 104. 8. item. 148. 9. *Isai.* 40. 12. And therefore 'tis probable they were Created at the first. Unto this I might add, that in other Places Divine Wisdom, in shewing of its own Antiquity, saith, that he was *From the beginning, before the Earth or the Mountains were brought forth.* *Prov.* 8. 25. *Psal.* 90. 2.

5. If we may trust the Relations of Antiquity, there were many Monuments left undefaced after the Flood. *Joseph Ant. lib.* 1. *c.* 3.

So that if I intend to prove that the Moon is such a Habitable World as this is, 'tis requisite that I shew it to have the same Conveniences of Habitation as this hath; and here if some Rabbi or Chymick were to handle the Point, they would first prove it out of Scripture, from that place in *Moses* his Blessing, where he speaks of the Ancient Mountains and lasting Hills, *Deut.* 33. ראשי הרי קדם ונבעות עולם for having immediately before mentioned those Blessings which should happen unto *Joseph* by the Influence of the Moon, he does presently Exegetically Iterate them in Blessing him with the chief things of the Ancient Mountains and lasting Hills; you may also see the same expression used in *Jacobs* Blessing of *Joseph.* *Gen.* 49. 26.

But however we may deal *pro* or *con* in Philosophy, yet we must not be too bold with Divine Truths, or bring Scripture to Patronize any Fancy of our own, though, per-

perhaps, it be a Truth. I am not of their Mind who think it a good Course to Confirm Philosophical Secrets from the letter of the Scripture, or by abusing some Obscure Text in it. Methinks it favors too much of that Melancolly Humour of the Chymicks, who, aiming in all their studies at the making of gold, do perswade themselves, that the most Learned and Subtile of the Ancient Authors, in all their Obscure Places do mean some such Sense as may make to their purpose. And hence it is that they derive such strange Mysteries from the Fables of the Poets, and can tell you what great Secrets it was that Antiquity did hide under the Fiction of *Jupiter* being turned into a shower of Gold: of *Mercury* being made the Interpreter of the Gods: of the *Moon* descending to the Earth for the love of *Endymion*: with such Ridiculous Interpretations of these and the like Fables, which any reasonable considering Man cannot conceive to proceed from any, but such as are distracted. No less Fantastical in this kind are the Jewish Rabbies, amongst whom is not any Opinion whether in Nature or Policy, whether true or false, but some of them, by a Cabalistical Interpretation can Father it upon a dark Place of Scripture, or (if need be) upon a Text that is clean contrary. There being not any Absurdity so gross and incredible for which these Abusers of the Text will not find out an Argument. Whereas 'tis

the

the more Natural way, and should be Observed in all Controversies, to apply unto every thing, the proper proofs of it; and when we deal with Philosophical Truths, to keep our selves within the bounds of Humane Reason and Authority.

But this by the way. For the better proof of this Proposition, I might here Cite the Testimony of *Diodorus*, who thought the Moon to be full of Rugged Places; *velut terrestribus tumultis superciliosam*; but he Erred much in some Circumstances of this Opinion, especially where he says, there is an Island amongst the *Hyperboreans*, wherein those Hills may to the Eye be plainly discovered; and for this reason * *Cælius* calls him a Fabulous Writer. But you may see more express Authority for the Proof of this in the Opinions of *Anaxagoras* and *Democritus*, who held that this Plannet was full of Champion Grounds, Mountains and Vallies. And this seemed likewise probable unto *Augustinus Nifus*, whose words are these: *Forsitan non est remotum dicere lunæ partes esse diversas, veluti sunt partes terræ, quarum aliæ sunt vallosæ, aliæ montosæ, ex quarum differentia effici potest facies illa lunæ; nec est rationi dissonum, nam luna est corpus imperfectè Sphæricum, cum sit corpus ab ultimo cœlo elongatum, ut supra dixit Aristoteles.* "Perhaps, it would not be amiss to say "that the parts of the Moon were divers, "as the parts of this Earth, whereof some "are Vallies, and some Mountains, from "the

* *Lect. ant. l. 1. c. 15.*

Plut. de plac. l. 2. c. 25.

De Cœlo l. 2. part. 49.

"the difference of which, some Spots in "the Moon may proceed; nor is this a "gainst reason; for that Plannet cannot "be perfectly Spherical, since 'tis so remote "a Body from the first Orb, as *Aristotle* "had said before. You may see this Truth

De Mundi sub. pars. 3. c. 4.

affented unto by *Blancanus* the Jesuite, and by him confirmed with divers Reasons. *Keplar* hath Observed in the Moons Eclipses, that the Division of her inlightned part from the shaded, was made by a crooked unequal Line, of which there cannot be any probable cause conceived, unless it did arise from the Ruggedness of that Plannet; for it cannot at all be produced from the shade of any Mountains here upon Earth, because these would be so lessened before they could reach so high in a Conical shadow, that they would not be at all sensible unto us (as might easily be Demonstrated) nor can it be conceived what reason of this difference there should be in the Sun. Wherefore there being no other Body that hath any thing to do in Eclipses, we must necessarily conclude, that it is caused by variety of parts in the Moon it self, and what can these be but its Gibbosities? Now if you should ask a reason why there should be such a Multitude of these in that Plannet, the same *Keplar* shall jest you out an Answer. Supposing (saith he) that those Inhabitants are bigger than any of us in the same proportion, as their days are longer than ours, *viz.* By Fifteen times it

Astron. Opt. c. 6. sum. 9.

may

may be, for want of Stones to Erect such vast Houses as were requisite for their Bodies, they are fain to Dig Great and Round Hollows in the Earth, where they may both procure Water for their Thirst, and turning about with the Shade, may avoid those great Heats which otherwise they would be liable unto, or if you will give *Cæsar la Galla* leave to guess in the same manner, he would rather think that those Thirsty Nations cast up so many, and so great heaps of Earth in digging of their Wine Cellars; but this only by the way. *Kep. append. Selenogra.* *Nuncius Sydereus.*

I shall next produce Eye-witness of *Galilæus*, on which I most of all depend for the proof of this Proposition, when he beheld the new Moon through his perspective, it appeared to him under a Rugged and Spotted Figure, seeming to have the darker and enlightned parts divided by a Tortuous Line, having some Parcels of Light at a good distance from the other; and this difference is so remarkable, that you may easily perceive it through one of those ordinary Perspectives, which are commonly sold amongst us; but for your better apprehending of what I deliver, I will set down the Figure as I find it in *Galilæus*.

Suppose A B C D to represent the appearance of the Moons Body being in a Sextile, you may see some brighter parts Separated at a pretty distance from the other, which can be nothing else but a Reflexion of the Sun-Beams, upon some parts that are higher than the rest, and those Obscure Gibbosities which stand out towards the enlightened parts, must such Hollow and Deep Places, whereto the Rays cannot Reach.

But

But when the Moon is got farther off from the Sun, and come to that fulness as this Line B D doth represent her under, then do these parts also receive an equal Light, excepting only that difference which doth appear betwixt their Sea and Land. And if you do consider how any Rugged Body would appear, being enlightned, you would easily conceive that it must necessarily seem under some such Gibbous unequal form, as the Moon is here represented. Now for the Infallibility of these appearances, I shall refer the Reader to that which hath been said in the Sixth Proposition.

But *Cæsar la Galla* affirms, that all these appearances may consist with a plain Superficies, if we suppose the parts of the Body to be some of them *Diaphanous*, and some *Opacous*; and if you Object, that the Light which is convay'd to any Diaphanous part in a plain Superficies, must be by a continued Line, whereas here there appear many brighter parts among the Obscure, at some distance from the rest. To this he answers, it may arise from some Secret Conveyances and Channels within her Body, that do consist of a more Diaphanous matter, which being covered over with an Opacous Superficies, the Light passing through them, may break out a great way off; whereas the other parts betwixt, may still remain Dark. Just as the River *Arethusa* in *Sicily*, which runs under ground for a great way, and afterwards breaks out again. But because this is one of the

chiefeſt Fancies, whereby he thinks he hath fully anſwered the Argument of this Opinion; I will therefore ſet down his anſwer in his own words, leſt the Reader might ſuſpect more in them, than I have expreſſed. *cap.* 11. *Non eſt impoſſibile cæcos ductus diaphani & perſpicui corporis, ſed opacâ ſuperficie prætendi, uſque in diaphanam aliquam ex profundo in ſuperficiem emergentem partem, per quos ductus lumen inlonga poſt modum interſtitio erumpat, &c.* But I reply, if the Superficies betwixt theſe two enlightened parts, remain dark because of its Opacity, then would it always be dark, and the Sun could not make it partake of Light, more than it could of Perſpicuity: But this contradicts all Experience, as you may ſee in *Galilæus*, who affirms, that when the Sun comes nearer to his Oppoſition, then, that which is betwixt them both, is enlightned as well as either. Nay, this oppoſes his own Eye-witneſs, for he confeſſes himſelf, that he ſaw this by the glaſs. He had ſaid before, that he came to ſee thoſe ſtrange Sights diſcovered by *Galilæus* his glaſs, with an intent of Contradiction, and you may read that confirmed in the weakneſs of this anſwer, which rather bewrays an Obſtinate, than a perſwaded Will; for otherwiſe ſure he would never have undertook to have deſtroyed ſuch certain proofs with ſo groundleſs a Fancy.

Syſt. mundi cal. 1. That Inſtance of *Galilæus*, would have been a better Evaſion, had this Author been Acquainted with it; who might then have compared the Moon to that which we call Mother of Pearl, which though it be moſt

most Exactly Polished in the Superficies of it; yet will seem unto the Eye as if there were divers Swellings and Risings in its several Parts. But yet, this neither would not well have shifted the Experiment of the Perspective. For these rugged parts do not only appear upon one side of the Moon, but as the Sun does turn about in Divers Places, so do they also cast their Shadow. When the Moon is in her Increase, then do they cast their shadows to the East. When she is in the Decrease, and the Sun on the other side of her, then likewise may we Discover these brighter Parts casting their shadowes Westward. Whereas in the full Moon there are none of all these to be seen.

But it may be Objected, that 'tis almost Impossible, and all together Unlikely, that in the Moon there should be any Mountains so high, as those Observations make them. For do but Suppose, according to the common Principles, that the Moons Diameter unto the Earths, is very neer to the Proportion of 2 to 7. Suppose withall that the Earths Diameter contains about 7000. Italian Miles, and the Moons 2000. (as is commonly granted.) Now *Galilæus* hath Observed, that some parts have been Enlightned, when they were the Twentieth part of the Diameter distant from the common term of Illumination. From whence, it must necessarily follow, that there may be some Mountains in the Moon, so high, that they are Able to cast a shadow a 100 Miles off. An opinion

that sounds like a Prodigy or a Fiction wherefore 'tis likely that either those Appearances are caused by somewhat else besides Mountains, or else those are fallible Observations, from whence may follow such Improbable, Inconceiveable Consequences.

But to this I Answer:

1. You must Consider the height of the Mountains is but very little, if you compare them to the Length of their shadows. Sir *Walter Rawleigh* Observes, that the Mount *Athos*, now called *Lacas*, casts its shadow 300 Furlongs, which is above 37 Miles; and yet that Mount is none of the Highest. Nay, *Solinus* (whom I should rather beleive in this kind) affirms, that this Mountain gives his shadow quite over the Sea, from *Macedon* to the isle of *Lemnos*, which is 700 Furlongs, or 84 Miles, and yet according to the common Reckoning it doth scarce reach 4 Miles upwards, in its Perpendicular height.

Hist. l. 1. c. 7. Sect. 11.

Polyhistor. c. 21.

2. I affirm, that there are very high Mountains in the Moon. *Kepler* and *Galileus* think, that they are higher than any which are upon our Earth. But I am not of their Opinion in this, because I suppose they go upon a false Ground, whilst they Conceive, that the highest Mountain upon the Earth is not above a Mile Perpendicular.

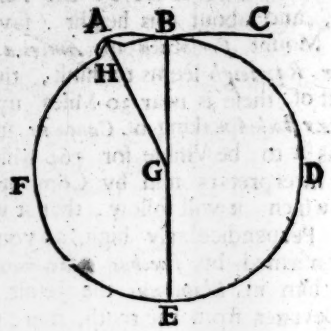
Whereas 'tis the common Opinion, and found true enough by Observation, that *Olympus*, *Athos*, *Taurus* and *Ennus*, with many

many others, are much above this height. *Teneriffa* in the Canary Islands, is commonly related to be above 8 Miles Perpendicular, and about this height (say some) is the Mount *Perjacuca* in *America*. * *Sir Walter Rawleigh* seems to think, that the highest of these is near 30 Miles upright: nay, *Aristotle* speaking of *Caucasus* in *Asia*, affirms it to be Visible for 560 Miles, as some Interpreters find by Computation; from which it will follow, that it was 78 Miles Perpendicularly high, as you may see confirmed by *Jacobus Mazonius*, and out of him in *Blancanus* the Jesuit. But this Deviates from the truth, more in Excess, than the other doth in defect. However, though these in the Moon are not so high as some amongst us; yet certain it is they are of a great height, and some of them at the least four Miles Perpendicular. This I shall prove from the Observation of *Galilæus*, whose Glass can shew to the Senses a proof beyond Exception; and Certainly that Man must needs be of a most timerous Faith, who dares not beleive his own Eye.

By that Perspective you may plainly discern some Enligtened parts (which are the Mountains) to be Distant from the other about the Twentieth part of the Diameter. From whence it will follow, that those Mountains must Necessarily be at the least, four Italian Miles in height.

* *Hist. l. 1. c. 7. Sect. 11. Meteor. l. c. 11.*

Comparatio Arist. cum. Platone. Sect. 3 c. 5. Expost. in loc. Math. Arist. loc. 148.



For let B D E F be the Body of the Moon, A B C will be a Ray or Beam of the Sun, which Enlightens a Mountain at A, and B is the point of Contingency; the distance betwixt A and B, must be supposed to be the Twentieth part of the Diameter, which is an 100 Miles, for so far are some Enlightened parts severed from the common term of Illumination. Now the Aggregate of the quadrate from A B a Hundred, and B G a 1000 will be 1010000; unto which the Quadrat arising from A G must be equal; according to the 47 Proposition in the first Book of Elements. Therefore

fore the whole Line A G is ſomewhat more than 104. and the diſtance betwixt H A muſt be above 4 Miles, which was the thing to be Proved.

But it may be again Objected, if there be ſuch Rugged parts, and ſo high Mountains, why then cannot we Diſcern them at this diſtance? why doth the Moon appear unto us ſo exactly Round, and not rather as a Wheel with Teeth.

I Anſwer, by reaſon of too great a diſtance; For if the whole Body appear to our Eye ſo little, then thoſe parts which bear ſo ſmall a Proportion to the whole, will not at all be Senſible.

But it may be Replied, if there were any ſuch remarkable Hills, why does not the limb of the Moon appear like a Wheel with Teeth, to thoſe who look upon it through the great Perſpective, on whoſe Witneſs you ſo much depend? or what Reaſon is there that ſhe Appears as Exactly Round through it, as ſhe doth to the bare Eye? Certainly then, either there is no ſuch thing as you Imagin, or elſe the Glaſs fails much in this Diſcovery.

To this I ſhall Anſwer out of *Galilæus.*

1. You muſt know that there is not meerly one rank of Mountains, about the Edg of the Moon, but Divers Orders, one Mountain behind another, and ſo there is ſomewhat to hinder thoſe Void

ſpaces

ſpaces which otherwiſe, Perhaps, might appear.

Now, where there be many Hills, the Ground ſeems even to a Man that can ſee the Tops of all. Thus when the Sea rages, and many vaſt Waves are Lifted up, yet all may appear plain enough to one that ſtands at the Shore. So where there are ſo many Hills, the Inequality will be leſs Remarkable, if it be Diſcerned at a Diſtance.

2. Though there be Mountains in that part which appears unto us to be the Limb of the Moon, as well as in any other place, yet the bright Vapours hide there Appearance: for there is an Orb of thick Vaporous Air that doth Immediately compaſs the Body of the Moon, which though it have not ſo great Opacity, as to terminate the Sight, yet being once Enlightened by the Sun, it doth Repreſent the Body of the Moon under a greater Form, and hinders our Sight from a Diſtinct view of her true Circumference. But of this in the next Chapter.

Somn. Aſtr. not. 207. 3. *Keplar* hath Obſerved that in the Solary Eclipſes, when the Rays may paſs thorough this vaporous Air, there are ſome Gibboſities to be diſcerned in the Limb of the Moon.

I have now ſufficiently proved, that there are Hills in the Moon, and hence it may ſeem likely, that there is alſo a World; for ſince Providence hath ſome ſpecial end in all

all its works, certainly then these Mountains were not produced in vain; and what more probable meaning can we conceive there should be, than to make that place convenient for Habitation?

PROP. X.

That there is an Atmo-sphæra, or an Orb of gross, Vaporous Air, Immediatley encompassing the Body of the Moon.

AS that part of our Air which is nearest to the Earth, is of a thicker Substance than the other, by reason 'tis always mixed with some Vapours, which are continually exhaled into it. So is it equally requisite, that if there be a World in the Moon, that the Air about that, should be alike qualified with ours. Now, that there is such an Orb of gross Air, was first of all (for ought I can Read) Observed by *Meslin*, afterwards assented unto by *Keplar* and *Galilæus*, and since by *Baptista Cisatus*, *Sheiner* with others, all of them confirming it by the same Arguments which I shall only

Vide Euseb. Nicrem. de Nat. Hist. l. 2. c. 11.

only Cite, and then leave this Propoſition.

1. 'Tis not improbable that there ſhould be a Sphere of groſſer Air about the Moon; becauſe 'tis Obſerved, that there are ſuch kind of Evaporations which proceed from the Sun it ſelf. For there are diſcovered divers movable Spots, like Clouds, that do encompaſs his Body: which thoſe Authors, who have been moſt frequently verſed in theſe kind of Experiments and Studies, do conclude to be nothing elſe but Evaporations from it. The Probability and Truth of which Obſervations may alſo be inferred from ſome other appearances. As,

1. It hath been Obſerved, that the Sun hath ſometimes for the ſpace of four Days together, appeared as Dull and Ruddy almoſt as the Moon in her Eccliſes; in ſo much that the Stars have been ſeen at Mid-day. Nay, he hath been conſtantly darkned for almoſt a whole Year, and never ſhined, but with a kind of heavy and duskiſh Light, ſo that there was ſcarce heat enough to Ripen the Fruits. As it was about the time when *Cæſar* was Killed. Which was recorded by ſome of the Poets. Thus *Virgil*, ſpeaking of the Sun.

So. A. D. 1547. April. 24. to the 28.

Ille etiam extincto miſeratus Cæſare Romam.
Cum caput obſcurâ nitidum ferrugine texit,
Impiaque æternam timuerunt ſæcula noctem.

He

He pitying Rome, *when as great* Cæsar
Di'd.
His Head within a Mourning-vail did
hide.
And thus the Wicked Guilty World did
Fright.
With doubtful Fears of an Eternal
Night.

Ovid likewise speaking of his Death

.....Solis quoque tristis imago
Lurida sollicitis præbebat lumina terris.
.....The Suns sad Image then
Did yeild a lowring light to Fearful Men.

Now these appearances could not arise from any lower Vapour. For then 1. They would not have been so Universal as they were, being seen through all Europe; or else 2. That Vapour must have covered the Stars as well as the Sun, which yet notwithstanding were then plainly Discerned in the Day time. You may see this Argument Illustrated in another the like case. Chap. 12. Hence then it will follow, that this Fuliginus matter, which did thus obscure the Sun, must needs be very near his Body; and if so, then, what can we more Probably guess it to be, than Evaporations from it?

2. 'Tis observed, that in the Suns total Eclipses, when there is no part of his Body discernable, yet there does not always follow so great a Darkness, as might be Expected from his total Absence. Now 'tis probable, that the Reason is, because these thicker Vapours, being Enlightned by his Beams, do convey some Light unto us, not-

notwithstanding the Interposition of the Moon betwixt his Body and our Earth.

3. This likewise is by some guest to be the Reason of the *Crepusculum*, or that Light which we have before the Suns Rising.

Now, if there be such Evaporations from the Sun, much more then from the Moon, which does consist of a more Gross and Impure Substance. The other Arguments are taken from several Observations in the Moon herself, and do more directly tend to the proof of this Proposition.

2. 'Tis Observed, that so much of the Moon as is enlightned, is always part of a bigger Circle, than that which is darker. The frequent Experience of others hath proved this, and an easie Observation may quickly confirm it. But now this cannot proceed from any other cause so probable, as from this Orb of Air; especially when we consider how that Planet shining with a borrowed Light, doth not send forth any such Rays as may make her appearance bigger than her Body.

3. When the Moon being half Enlightened: begins to cover any Star, if the Star be towards the Obscurer part, then may it by the Perspective be discerned, to be nearer unto the Center of the Moon, than the outward Circumference of the Enlightned part. But the Moon being in the

the Full; then does it seem to receive these Stars, within its Limb.

4. Though the Moon do sometimes appear the first Day of her Change, when so much as appears Enlightened, cannot be above the 80 part of her Diameter, yet then will the Horns seem at least to be of a Fingers breadth in Extension. Which could not be, unless the Air about it were Illuminated,

5. 'Tis Observed, in the Solary Eclipses, that there is some times a great Irepidation about the Body of the Moon, from which we may likewise argue an Atmo-sphæra, since we cannot well conceive what so probable a cause there should be of such an appearance as this, *Quod radii Solares à vaporibus Lunam ambientibus fuerint interclusi*, that the Sun-beams were broken and refracted by the Vapours that encompassed the Moon. *Scheiner. Ros. Ursi. l. 4. pars 2. c. 27.*

6. I may add the like Argument taken from another Observation, which will be easily tried and granted. When the Sun is Eclipsed, we discern the Moon as she is in her own natural Bigness; but then she appears somewhat less than when she is in the Full, though she be in the same place of her supposed Excentrick and Epicycle; and therfore *Tycho* hath Calculated a Table for the Diameter of the divers New Moons. But now there is no Reason so Probable, to Salve this appearance, as to place an Orb of thicker Air, near the Body

Body of that Plannet, which may be Enlightened by the Reflected Beams, and through which the direct Ryas may easily Penetrate.

But some may Object; that this will not consist with that which was before delivered, where I said, that the thinnest parts had least Light.

If this were true, how comes it to pass then, that this Air should be as Light as any of the others parts, when as 'tis the Thinnest of all?

I Answer, if the Light be received by Reflection only, then the thickest Body hath most, because it is best able to beat back the Rays; but if the Light be received by Illumination (especially if there be an Opacous Body behind, which may double the Beams by Reflexion) as it is here, then I deny not but a thin Body may Retain much Light, and perhaps, some of those Appearances which we take for Fiery Comets, are nothing else but a bright Cloud enlightened; So that Probable it is, there may be such Air without the Moon; and hence it comes to pass, that the greater Spots are only Visible towards her Middle parts, and none near the Circumference; not, but that there are some, as well in those parts, as elsewhere, but they are not there Perceivable, by reason of those brighter Vapours which hide them.

Prop.

PROP. XI.

That as their World is our Moon, ſo our World is their Moon.

I Have already handled the firſt thing that I Promiſed, according to the Method which *Ariſtotle* uſes in his Book *de Mundo*, and ſhew'd you the neceſſary parts that belong to this World in the Moon. In the next place 'tis requiſite that I proceed to thoſe things which are Extrinſecal unto it, as the Seaſons, the Meteors, and the Inhabitants.

1. Of the Seaſons;

And if there be ſuch a World in the Moon, 'tis requiſite then that their Seaſons ſhould be ſome way Correſpondent unto ours, that they ſhould have Winter and Summer, Night and Day, as we have.

Now that in this Planet there is ſome Similitude of Winter and Summer, is affirmed by *Ariſtotle* himſelf, ſince there

De gen. animal. l. 4. 21.

is one Hemiſphere that hath always Heat and Light, and the other that hath Darkneſs and Cold. True indeed, their Days and Years are always of one and the ſame Length (unleſs we make one of their Years to be 19 of ours, in which ſpace all the Stars do Ariſe after the ſame Order.) But tis ſo with us alſo under the Poles, and therefore that great difference is not Sufficient to make it altogether unlike ours; nor can we expect that every thing there ſhould be in the ſame manner as it is here below, as if Nature had no way but one to bring about her Purpoſe. We have no Reaſon then to think it neceſſary that both theſe Worlds ſhould be altogether alike, but it may ſuffice if they be Correſpondent in ſomething only. However, it may be queſtioned whether it doth not ſeem to be againſt the Wiſdom of Providence, to make the Night of ſo great a Length, when they have ſuch a long time unfit for Work? I Anſwer, No; ſince tis ſo, and more with us alſo under the Poles; and beſides, the general Length of their Night is ſome what abated in the Bigneſs of their Moon which is our Earth. For this Returns as great a Light unto that Plannet, as it Receives from it. But for the better Proof of this, I ſhall firſt free the Way from ſuch Opinions as might otherwiſe hinder the ſpeed of a clearer Progreſs.

Golden Number.

Plut. de. fac. lunæ. *Plutarch*, one of the cheif Patrons of this World

World in the Moon, doth directly Contradict this Proposition, Affirming, that those who Live there, may discern our World, as the Dreggs and Sediment of all other Creatures, appeaing to them through Clouds and Foggy mists, and that altogether Devoid of Light, being Base and unmoveable; so that they might well imagine the Dark place of Damnation to be here Situate, and that they only were the Inhabiters of the World, as being in the midst betwixt Heaven and Hell.

To this I may Answer, 'tis Probable that *Plutarch* spake this Inconsiderately, and without a Reason, which makes him likewise fall into another Absurdity, when he says our Earth would appear Immovable; whereas Questionless, though it did not, yet would it seem to Move, and theirs to stand Still, as the Land doth to a Man in a Ship; according to that of the Poet:

Provehimur portu, terræque urbesque recedunt.

And I doubt not but that the Ingenious Author would easily have Recanted, if he had been but acquainted with those Experiences which Men of latter times have found out, for the Confirmation of this Truth.

2. Unto him assents *Macrobius*; whose Words are these; *Terra accepto solis lumine clarescit tantummodo, non relucet.* "The "Earth is by the Sun Beams made Bright, "but *Somn. Scip. l.* 1. *c.* 19.

"but not able to Enlighten any thing so far. And his Reason is, because this being of a thick and Gross Matter, the Light is Terminated in its Superficies, and cannot Penetrate into the Substance? whereas the Moon doth therefore seem so Bright to us, because it receives the Beams within it self. But the Weakness of this Assertion, may be easily Manifest by a common Experience; polished Steal (whose Opacity will not give any Admittance to the Raies) reflects a stronger Heat than Glass, and so Consequently a greater Light.

3. 'Tis the general Consent of Philosophers, that the Reflection of the Sun-Beams from the Earth doth not reach much above half a Mile high, where they Terminate the first Region, so that to Affirme they might ascend to the Moon, where to say, there were but one Region of Air, which Contradicts the proved and received Opinion.

Unto this it may be Answered:

That it is indeed the common Consent, that the Reflexion of the Sun-Beams reach only to the Second Region; but yet some there are, and those too, Philosophers of good Note, who thought otherwise. Thus *Plotinus* is Cited by *Cælius*, *si concipiat te in sublimi quopiam mundi loco, unde oculis subjiciatur terræ moles aquis circumfusa, & solis syderumq; radiis illustrata, non aliam profecto visam iri probabile est, quam qualis modo visatur lunaris globi species,* "If you "con-

Ant. lect. l. 1. c. 4.

" conceive your ſelf to be in ſome ſuch high " Place, where you might Diſcerne " the whole Globe of the Earth and " Water, when it was Enlightened by the " Sun's Raies, 'tis Probable it would then Ap- " pear to you in the ſame Shape as the " Moon doth now unto us. So *Paulus Foſcarinus*. *Terra nihil aliud eſt quam altera Luna, vel Stella, taliſq; nobis appareret, ſi ex convenienti elongatione eminus conſpiciretur, in ipſaq; obſervari poſſent eædem aſpectuum varietates, quæ in Lunâ apparent.* The Earth is nothing elſe but another Moon or Star, and would appear ſo unto us if it were beheld at a Convenient Diſtance, with the ſame Changes and Varieties as there are in the Moon. Thus alſo *Carolus Malapertius*, whoſe Words are theſe, *Terra hæc noſtra, ſi in luna conſtituti eſſemus, ſplendida prorſus quaſi non ignobilis planeta, nobis appareret.* " If we were placed in " the Moon, and from thence beheld this " Earth, it would appear unto us very " Bright, like one of the Nobler Plannets. Unto theſe doth *Fromondus* aſſent, when he ſays, *Credo equidem quod ſi oculus quiſpiam in orbe lunari foret, globum terræ & aquæ inſtar ingentis ſyderis à ſole illuſtrem conſpiceret.* " I beleive that this Globe of " Earth and Water would appear like " ſome great Star to any one, who ſhould " Look upon it from the Moon, Now this could not be, nor could it ſhine ſo Remarkably, unleſs the Beams of Light

In epiſt. ad Sebaſt. Fantonum.

Præfat. ad Auſtriaca ſyd.

Meteor. l. 1 c. 2. Art. 2.

were Reflected from it. And therefore the ſame *Fromundus* expreſly holds, that the firſt Region of Air is there Terminated, where the Heat cauſed by Reflexion begins to Languiſh, whereas the Beams themſelves do paſs a great way farther. The chief Argument which doth moſt plainly manifeſt this Truth, is taken from a common Obſervation which may be eaſily Tryed.

If you behold the Moon a little before or after the Conjunction, when ſhe is in a Sextile with the Sun, you may diſcern not only the part which is enlightned, but the reſt alſo to have in it a kind of a duskiſh Light; but if you chuſe out ſuch a Situation, where ſome Houſe or Chimney (being ſome 70 or 80 Paces diſtant from you) may hide from your Eye the enlightened Hornes, you may then diſcern a greater and more remarkable ſhining in thoſe parts unto which the Sun-Beams cannot reach; nay there is ſo great a Light, that by the help of a good perſpective you may diſcern its Spots. In ſo much that *Blancanus* the Jeſuit ſpeaking of it, ſays, *Hæc experientia ita me aliquando fefellit, ut in hunc fulgorem caſu ac repente incidens, exiſtimarim novo quodam miraculo tempore adoleſcentis lunæ factum eſſe plenilunium.* "This "Experiment did once ſo deceive me, that "happening upon the ſight of this bright- "neſs upon a ſudden, I thought that by "ſome new miracle the Moon had been "got

De mundi fab. p. 3. *c.* 3.

"got into her Full a little after her "change.

But now this Light is not proper to the Moon; it doth not proceed from the Rays of the Sun which doth penetrate her Body, nor is it cauſed by any other of the Plannets and Stars. Therefore it muſt neceſſarily follow, that it comes from the Earth. The two firſt of theſe I have already proved, and as for the laſt, it is confidently affirmed by *Cælius*, *Quod ſi in diſquiſitionem evocet quis, an lunari ſyderi lucem fœnerent planetæ item alii, aſſeveranter aſtruendum non fœnerare.* "If any ſhould ask whether the "other Plannets lend any Light to the "Moon? I anſwer, they do not. True indeed, the Noble *Tycho* diſcuſſing the reaſon of this Light, attributes it to the Plannet *Venus*; and I grant that this may convey ſome Light to the Moon; but that it is not the cauſe of this whereof we now Diſcourſe, is of it ſelf Sufficiently plain, becauſe *Venus* is ſometimes over the Moon, when as ſhe cannot convey any Light to that part which is turned from her.

Ant. Lect. l. 20. c. 5.

Progym. 1.

It doth not proceed from the fixed Stars; for then it would retain the ſame Light in Eclipſes, whereas the Light at ſuch times is more Ruddy and Dull. Then alſo the Light of the Moon would not be greater or leſſer, according to its diſtance from the Edge of the Earths ſhadow, ſince it did at all times equally participate this Light of the Stars.

In brief, this is neither proper to the Moon, nor does it proceed from any Penetration of the Sun's Raies, or the ſhining of *Venus*, or the other Plannets, or the fixed Stars. Now becauſe there is no other Body in the whole Univerſe, ſave the Earth, it remains that this Light muſt neceſſarily be cauſed by that, which with a Juſt Gratitude repaiſe to the Moon ſuch Illumination as it receives from her.

And as Loving Friends, equally Participate of the ſame Joy and Grief, ſo do theſe Mutually partake of the ſame Light from the Sun, and the ſame Darkneſs from the Eclipſes, being alſo ſeverally helped by one another in their greateſt wants: For when the Moon is in Conjunction with the Sun, and her upper part receives all the Light, then her lower Hemiſphere (which would otherwiſe be altogether dark) is enlightened by the Reflexion of the Sun-Beams from the Earth. When theſe two Plannets are in Oppoſition, then that part of the Earth which could not receive any Light from the Sun-Beams, is moſt enlightened by the Moon, being then in her Full; and as ſhe doth moſt Illuminate the Earth when the Sun-Beams cannot, ſo the grateful Earth Returns to her as great (nay greater) Light when ſhe moſt wants it; ſo that always that viſible part of the Moon, which receives nothing from the Sun, is enlightened by the Earth, as is proved by *Galilæus*, with many more Arguments,

guments, in that Treatiſe which he calls *Syſtema mundi.* True indeed, when the Moon comes to a quartile, then you can neither diſcern this Light, nor yet the darker part of her Body, and that for a double reaſon.

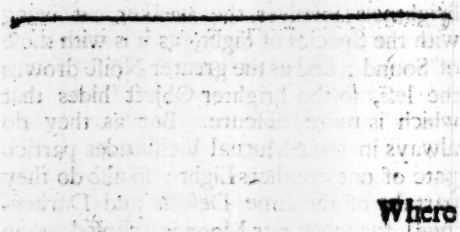
1. Becauſe the nearer it comes to the Full, the leſs Light does it receive from the Earth, whoſe Illumination does always decreaſe in the ſame Proportion as the Moon does Increaſe.

2. Becauſe of the Exuperancy of the Light in the other parts. *Quippe illuſtratum medium ſpeciem recipit valentiorem,* the clearer brightneſs involves the weaker, it being with the Species of Sight, as it is with thoſe of Sound; and as the greater Noiſe drowns the leſs, ſo the brighter Object hides that which is more obſcure. But as they do always in their Mutual Viciſſitudes participate of one anothers Light; ſo alſo do they partake of the ſame Defects and Darkenings; for when our Moon is Eclipſed, then is their Sun darkened; and when our Sun is Eclipſed, then is their Moon deprived of its Light, as you may ſee affirmed by *Meſlin.* *Quod ſi terram nobis ex alto liceret intueri, quemadmodum deficientem lunam ex longinquo ſpectare poſſumus, videremus tempore Eclipſis ſolis terræ aliquam partem lumine ſolis deficere, eodem planè modo ſicut ex oppoſitio luna deficit.* "If we might behold "this Globe of Earth at the ſame diſtance, "as we do the Moon in her Defect, we might

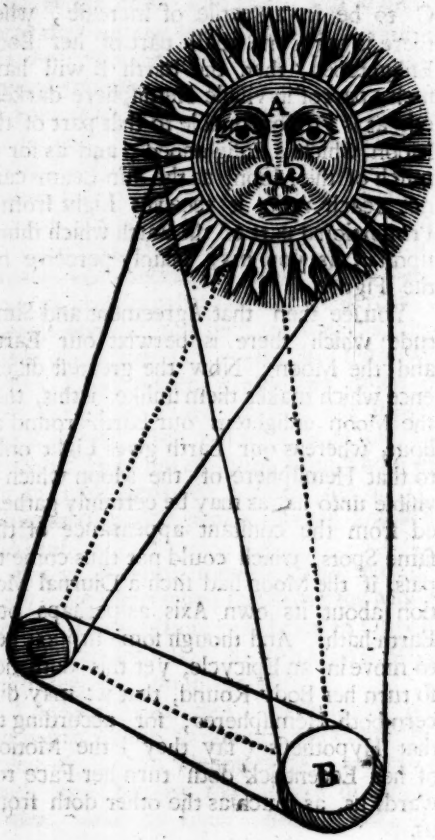
Scal. exerc. 62.

Epit. Aſtro l.4.part.2.

" might discern some part of it darkened " in the Suns Eclipses, just so as the Moon " is in hers. For as our Moon is Eclipsed by the Interposition of our Earth, so is their Moon Eclipsed by the Interposition of theirs. The manner of this Mutual Illumination betwixt these two you may plainly discern in this Figure following.



Where


A
B

Where A represents the Sun, B the Earth, and C the Moon; Now suppose the Moon C to be in a Sextile of Increase, when there is only one small part of her Body Enlightened, then the Earth B will have such a part of its visible Hemisphere darkened, as is Proportionable to that part of the Moon which is Enlightened; and as for so much of the Moon, as the Sun-Beams cannot reach unto, it receives Light from a Proportional part of the Earth which shines upon it, as you may plainly perceive by the Figure.

You see then that Agreement and Similitude which there is betwixt our Earth and the Moon. Now the greatest difference which makes them unlike, is this, that the Moon enlightens our Earth round about, whereas our Earth gives Light only to that Hemisphere of the Moon which is visible unto us, as may be certainly gathered from the constant appearance of the same Spots, which could not thus come to pass, if the Moon had such a Diurnal Motion about its own Axis as perhaps our Earth hath. And though some suppose her to move in an Epicycle, yet this doth not so turn her Body Round, that we may discern both Hemispheres; for according to that Hypothesis (say they) the Motion of her Eccentrick doth turn her Face towards us, as much as the other doth from us.

But now, if any Question what they do

do for a Moon who Live in the upper part of her Body? I Anſwer, the ſolving of this, is the moſt uncertain and difficult thing that I know of, concerning this whole matter. But yet unto me this ſeems a probable Conjecture.

That the upper Hemiſphere of the Moon doth receive a Sufficient Light from thoſe Plannets about it; and amongſt theſe, *Venus* (it may be) beſtows a more eſpecial brightneſs, ſince *Galilæus* hath plainly diſcerned that ſhe Suffers the ſame increaſes and decreaſes, as the Moon hath, and 'tis probable that this may be perceived there, without the help of a Glaſs, becauſe they are far nearer it, than we. When *Venus* (ſaith *Keplar* lies down in the Perige or lower part of her ſuppoſed Epicycle, then is ſhe in Conjunction with her Husband the Sun, from whom after ſhe hath departed for the ſpace of Ten Months, ſhe gets *plenum uterum*, and is in the Full.

But you'l reply, though *Venus* may beſtow ſome Light when ſhe is over the Moon, and in Conjunction, yet being in Oppoſition ſhe is not viſible to them, and what ſhall they then do for Light?

I Anſwer, then they have none, nor doth this make ſo great a Difference betwixt thoſe two Hemiſpheres, as there is with us, betwixt the places under the Poles, and the Line. And beſides, 'tis Con-

Conſiderable, that there are two kind of Plannets.

1. Primarie, ſuch whoſe proper Circles do encompaſs the Body of the Sun, whereof there are Six. *Saturne*, *Jupiter*, *Mars*, *Ceres*, or the *Earth*, *Venus*, *Mercury*. As in the Frontiſpice.

2. Secondary, ſuch whoſe proper Circles are not about the Sun, but ſome of the other Primarie Plannets. Thus are there two about *Saturne*, four about *Jupiter*, and thus likewiſe does the Moon encompaſs our Earth. Now 'tis Probable that theſe leſſer, Secondary Plannets, are not ſo accommodated with all Conveniencies of Habitation, as the others that are more Principal.

But it may ſeem a very Difficult thing to Conceive, how ſo Groſs and Dark a Body as our Earth, ſhould yeild ſuch a clear Light as Proceeds from the Moon; and therefore the Cardinal *de Cuſa* (who thinks every Star to be a ſeveral World) is of Opinion, that the Light of the Sun is not able to make them appear ſo Bright; but the reaſon of their ſhining is, becauſe we behold them at a great Diſtance through their Regions of Fire which do ſet a ſhining Luſtre upon thoſe Bodies that of themſelves are Dark. *Unde ſi quis eſſet extra regionem ignis, terra iſta in circumferentia ſuæ regionis per medium ignis lucida ſtella appareret.* "So that, if a Man were beyond "the Region of Eire, this Earth would ap-

De docti. ig. l. 3. c. 12.

"appear through that, as a bright Star. But if this were the only Reaſon, then would the Moon be freed from ſuch Increaſes and Decreaſes as ſhe is now lyable unto.

Keplar thinks that our Earth receives that Light whereby it ſhines, from the Sun, but this (ſaith he) is not ſuch an intended clear Brightneſs as the Moon is capable of, and therefore he gueſſes, that the Earth there, is of a more Chokie ſoyl, like the Iſle of *Crete*, and ſo is better able to Reflect a ſtronger Light, whereas our Earth muſt ſupply this Intention with the quantity of its Body. But this I Conceive to be a needleſs Conjecture, ſince our Earth, if all things were well Conſidered, will be found able enough to Reflect as great a Light. For,

1. Conſider its Opacity; if you mark theſe Sublunary things, you ſhall perceive that amongſt them, thoſe that are moſt Perſpicuous, are not ſo well able to Reverberate the Sun-Beams, as the thicker Bodies. The Rays paſs ſingly through a Diaphanous matter, but in an Opacous ſubſtance they are doubled in their Return, and Multiplied by Reflexion. Now if the Moon and the other Plannets can ſhine ſo Clearly by beating back the Sun-Beams, why may not the Earth alſo ſhine as well, which agrees with them in the cauſe of this Brightneſs their Opacity?

2. Con-

2. Conſider what a clear Light we may Diſcern Reflected from the Earth in the midſt of Summer, and withall Conceive how much Greater that muſt be which is under the Line, where the Raies are more Directly and Strongly Reverberated.

3. 'Tis Conſiderable that though the Moon does in the Night time ſeem to be of ſo clear a Brightneſs, yet when we look upon it in the Day, it appears like ſome little, whitiſh Cloud: Not but that at both times, ſhe is of an equal Light in her ſelf. The Reaſon of this Difference is, becauſe in the Night we look upon it through a Dark and Obſcure *medium*, there being no other Enlightened Body, whoſe Brightneſs may Abate from this: Whereas in the Day time, the whole Heavens round about it, are of an equal Clearneſs, and ſo make it to appear with a weaker Light. Now becauſe we cannot ſee how the Enlightened parts of our Earth do look in the Night, therefore in comparing it with the Moon, we muſt not Conſider her, as ſhe is beheld through the Advantage of a Dark *Medium*, but as ſhe ſeems in the Day-time: Now, in any clear Sun-ſhine-Day, our Earth does appear as Bright as the Moon, which at the ſame time does ſeem like ſome duskiſh Cloud (as any little Obſervation may eaſily Manifeſt.) Therefore we need not doubt but that the Earth is as well able to give Light, as the Moon. To this, it may be added, that

thoſe

thoſe very Clouds, which in the Day-time ſeem to be of an equal Light to the Moon, do in the Evening become as Dark as our Earth; and as for thoſe of them, which are looked upon at any great Diſtance, they are often Miſtaken for the Mountains.

4. 'Tis Conſiderable, that though the Moon ſeem to be of ſo great a Brightneſs in the Night, by reaſon of its nearneſs unto thoſe ſeveral ſhadows which it caſts, yet is it of it ſelf Weaker than that part of Twilight, which uſually we have for half an Hour after Sun-ſet, becauſe we cannot, till after that time, Diſcern any ſhadow to be made by it.

5. Conſider the great Diſtance at which we behold the Plannets, for this muſt needs add much to their Shining; and therefore *Cuſanus* (in the above cited Place) thinks, that if a Man were in the Sun, that Plannet would not appear ſo Bright to him, as now it doth to us, becauſe then his Eye could diſcern but little, whereas here, we may Comprehend the Beams as they are Contracted in a narrow Body. *Keplar* beholding the Earth from a high Mountain, when it was Enlightened by the Sun, Confeſſes, that it appeared unto him of an incredible Brightneſs, whereas then he could only ſee ſome ſmall parts of it; but how much Brighter would it have appeared if he might in a direct Line behold the whole Globe of Earth, and theſe Rays

gathered together? So that if we Consider that great Light which the Earth receives from the Sun in the Summer, and then Suppose we were in the Moon, where we might see the whole Earth hanging in those vast Spaces, where there is nothing to Terminate the Sight, but those Beams which are there Contracted into a little Compass; I say, if we do well Consider this, we may easily Conceive that our Earth appears as Bright to those other Inhabitants in the Moon, as theirs doth to us.

But here it may be Objected, that with us, for many Days in the Year, the Heavens are so overclowded, that we cannot see the Sun at all, and for the most part, in our brightest Days, there are many scattered Clouds which shade the Earth in sundry Places; so that in this Respect, it must needs be unlike the Moon and will not be able to yeild so clear, unintermitted a Light, as it Receives from that Plannet;

To this I Answer.

1. As for those lesser brighter Clouds which for the most part are Scattered up and down in the cleareſt Days, these can be no Reason why our Earth should be of a Darker appearance, because these Clouds being near unto the Earth, and so not Distinguishable at so great a Distance from it, and likewise being Illuminated on their back Parts by the Sun

that

that ſhines upon them, muſt ſeem as Bright to thoſe in the Moon, as if the beams were Immediately Reflected from our Earth.

2. When theſe Clouds that are Interpoſed, are of any large Extention or great Opacity, as it is in Extraordinary laſting and great Rains, then there muſt be ſome Diſcernable alterations in the Light of our Earth; But yet this does not make it to Differ from the Moon: ſince it is ſo alſo with that Planet, as is ſhewed in the later part of the next Chapter.

PROP. XII.

That 'tis Probable there may be such Meteors belonging to that World in the Moon, as there are with us.

PLutarch Discussing this Point, Affirms, that it is not necessary there should be the same means of Growth and Fructifying in both these Worlds, since Nature might in her Policy find out more ways than one, how to bring about the same Effect. But however, he thinks it is Probable, that the Moon her self sendeth forth warm Winds, and by the Swiftness of her Motion, there should breath out a Sweat and Comfortable Air, Pleasant Dews, and gentle Moisture, which might serve for Refreshing and Nourishment of the Inhabitants and Plants in that other World.

But since they have all things alike with us, as Sea and Land, and Vaporous Air En-

Encompaſſing both, I ſhould rather therefore think, that Nature there ſhould uſe the ſame way of Producing Meteors, as ſhe doth with us (and not by a Motion, as *Plutarch* Suppoſes,) becauſe ſhe doth not love to Vary from her uſual Operations without ſome Extraordinary Impediment, but ſtill keeps her Beaten Path, unleſs ſhe be Driven thence.

One Argument whereby I ſhall Manifeſt this Truth, may be taken from theſe new Stars which have appeared in Divers Ages of the World, and by their Paralax, have been Diſcerned to have been above the Moon, ſuch as was that in *Caſſiopeia*, that in *Sagittarius*, with may others betwixt the Plannets. *Hipparchus* in his time took Eſpecial notice of ſuch as theſe, and therefore Fancied out ſuch Conſtellations, in which to place the Stars, ſhewing how many there were in every Afteriſm, that ſo afterwards, Poſterity might know, whether there were any new Star Produced, or any old one Miſſing. Now the Nature of theſe Comets may Probably Manifeſt, that in this other World there are other Meteors alſo; for theſe in all likelyhood are nothing elſe, but ſuch Evaporations cauſed by the Sun, from the Bodies of the Plannets. I ſhall Prove this, by ſhewing the Improbabilities and Inconveniences of any other Opinion.

Plin. nat. hiſt. l. 2. c 26.

For the better purſuit of this, 'tis in the firſt place requiſite, that I deal with our

chief adversary, *Cæsar la Galla*, who doth most directly oppose that Truth which is here to be proved. He endeavouring to confirm the Incorruptibility of the Heavens, and being there to satisfie the Argument which is taken from these Comets, he Answers it thus: *Aut argumentum desumptum ex parallaxi, non est efficax, aut si est efficax, ecrum instrumentorum usum decipere, vel ratione astri, vel medii, vel distantiæ, aut ergo erat in suprema parte aeris, aut si in cælo, tum forsan factum erat ex reflectione radiorum Saturni & Jovis, qui tunc in Conjunctione fuerant.* "Either the Argument from the Parallax is not Efficacious, or if it be, yet "the use of the Instruments might deceive, "either in regard of the Star, or the *Medium*, or the distance, and so this Comet "might be in the upper Regions of the "Air; or if it were in the Heavens, there "it might be produced by the Reflection of "the Rays from *Saturn* and *Jupiter*, who "were then in Conjunction. You see what shifts he is driven to, how he runs up and down to many Starting Holes, that he may find some shelter, and in stead of the strength of reason, he Answers with a Multitude of Words, thinking (as the Proverb is) that he may use Hail, when he hath no Thunder. *Nihil turpius* (saith *Seneca) *dubio & incerto, eadem modo referente, modo producente.* "What can there be more unseemly in one that should be a fair disputant, than to be now here, now there,

* *Epist.* 95.

and

"and so uncertain, that one cannot tell where to find him? He thinks that there are not Comets in the Heavens, because there may be many other reasons of such appearrances; but what he knows not; perhaps (he says) that Argument from the Paralax is not sufficient, or if it be, then there may be some deceit in the Observation. To this I may safely say, that he may justly be accounted a weak Mathematician who mistrusts the strength of this Argument; nor can he know much in Astronomy, who understands not the Paralax which is a Foundation of that Science; and I am sure that he is a Timerous Man, who dares not beleive the frequent Experience of his Senses, or trust to a Demonstration.

Vide Galilæum. Syst. mundi. colloq. 3.

True indeed, I grant 'tis possible, that the Eye, the *Medium*, and the distance may all deceive the beholder; but I would have him shew which of all these was likely to cause an Errour in this Observation? Meerly to say they might be deceived, is no Sufficient Answer; for by this I might confute the positions of all Astronomers, and Affirm the Stars are hard by us, because 'tis possible they may be deceived in their Observing distance. But I forbear any further reply; my Opinion is of that Treatise, that either it was set forth purposely to tempt a Confutation, that he might see the Opinion of *Galilæus* confirmed by others, or else it was invented with as much hast and Negligence as it was Printed, there

being in it, almoſt as many Faults as Lines.

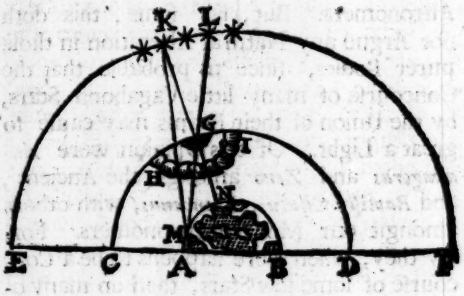
Others think, that theſe are not any new Comets, but ſome Ancient Stars that were there before, which now ſhine with that unuſual brightneſs, by reaſon of the Interpoſition of ſuch Vapours, which do Multiply their Light; and ſo the Alteration will be here only, and not in the Heavens. Thus *Ariſtotle* thought the appearance of the Milky way was produced. For he held, that there were many little Stars, which by their Influence did conſtantly attract ſuch a Vapour towards that place of Heaven, ſo that it always appeared white. Now by the ſame reaſon, may a brighter Vapour be the cauſe of theſe appearances.

But how probable ſoever this Opinion may ſeem, yet if well conſidered, you ſhall find it to be altogether abſurd and impoſſible: for,

1. Theſe Stars were never ſeen there before, and 'tis not likely, that a Vapour being hard by us, can ſo multiply that Light, which could not before be at all diſcerned.

2. This ſuppoſed Vapour cannot be either contracted into a narrow compaſs, or dilated into a broad. 1. It could not be within a little Space, for then that Star would not appear with the ſame Multiplied Light to thoſe in other Climates. 2. It cannot be a diliated Vapour, for then other Stars which were diſcerned through the ſame Vapour, would ſeem as big as that; this Ar-

Argument is the ſame in Effect, with that of the Paralax, as you may ſee in this Figure.



Suppoſe A B to be a Hemiſphere of one Earth, C D to be the upper part of the higheſt Region, in which there might be either a contracted Vapour, as G, or elſe a dilated one, as H I. Suppoſe E F likewiſe to repreſent half the Heavens, wherein was this appearing Comet at K. Now I ſay, that a contracted Vapour, as G, could not cauſe this appearance, becauſe an Inhabitant at M could not diſcern the ſame Star with the brightneſs, but perhaps another at L, betwixt which the Vapour is directly interpoſed. Nor could it be cauſed by

by a dilated Vapour, as H I, becauſe then all the Stars that were diſcerned through it, would be perceived with the ſame brightneſs.

'Tis neceſſary therefore that the cauſe of this appearance ſhould be in the Heavens. And this is granted by the moſt and beſt Aſtronomers. But, ſay ſome, this doth not Argue any Natural Alteration in thoſe purer Bodies, ſince 'tis probable that the Concourſe of many little Vagabond Stars, by the Union of their Beams may cauſe ſo great a Light. Of this Opinion were *Anaxagoras* and *Zeno* amongſt the Ancient, and *Baptiſta Ciſatus*, *Blancanus*, with others amongſt our Modern Aſtronomers. For, ſay they, when there happens to be a Concourſe of ſome few Stars, then do many other Fly unto them from all the parts of Heaven like ſo many Bees unto their King. But 1. 'Tis not likely that amongſt thoſe which we Count the fixed Stars, there ſhould be any ſuch uncertain Motions, that they can wander from all parts of the Heavens, as if Nature had neglected them, or forgot to appoint them a Determinate Courſe. 2. If there be ſuch a Conflux of theſe, as of Bees to their King, then what reaſon is there, that they do not ſtill tarry with it, that ſo the Comet may not be diſſolved? But enough of this. You may commonly ſee it Confuted by many other Arguments. Others there are, who affirm theſe to be ſome new Created Stars, pro-

Clavius in ſphæram. cap. 1.

produced by an extraordinary Supernatural Power. I answer, true indeed, tis possible they might be so, but however, 'tis not likely they were so, since such appearances may be salved some other way; wherefore to Fly unto a Miracle for such things, were a great Injury to Nature, and to derogate from her skill; an Indignity much mis-becoming a Man who professes himself to be a Philosopher. *Miraculum* (saith one) *est ignorantiæ Asylum*, a Miracle often serves for the Receptacle of a lazy Ignorance; which any industrious Spirit would be ashamed of, it being but an idle way to shift off the Labour of any further search. But here's the misery of it, we first tye our selves unto *Aristotles* Principles, and then conclude that nothing could contradict them, but a Miracle; whereas 'twould be much better for the Common-Wealth of Learning, if we would ground our Principles rather upon the frequent Experiences of our own, than the bare Authority of others.

Some there are who think, that these Comets are nothing else, but Exhalations from our Earth, carryed up into the higher parts of the Heaven. So *Peno, Rothmannus & Galilæus.* But this is not possible, since by Computation 'tis found, that one of them is above 300 times bigger than the whole Globe of Land and Water. Others therefore have thought, that they did proceed from the Body of the Sun, and that

Tycho Progym. l. 1. *c.* 9.

Plan-

Plannet only is *Cometarum officina, unde tanquam emissarii & exploratores emittterentur brevi ad solem redituri*: The Shop or Forge of Comets from whence they were sent, like so many Spies, that they might in some short space return again. But this cannot be, since if so much matter had proceeded from him alone, it would have made a sensible Diminution in his Body. The Noble *Tycho* therefore thinks, that they consist of some such Fluider parts of the Heaven, as the Milky way is framed of, which being condenst together, yet not attaining to the consistency of a Star, is in some space of time rarifyed again into its wonted Nature. But this is not likely; because the appearance of the Milky way does not arise from some Fluider parts of the Heaven (as he supposes) but from the Light of many lesser Stars which are thereabouts. And therefore it is usually thus described. *Via lactea nihil aliud est quàm innumerabiles stellarum fixarum greges qui confuso & pallenti lumine tractum illum inalbant.* The Milky way is nothing else but the Pale and Confused Light of many lesser Stars, whereby some parts of the Heaven are made to appear white.

Fromond. Meteor. l. 2. c. 5. art. 2.

Item Vesta tract. 3. c. 2.

And beside, what likely cause can we conceive of this Condensation, unless there be such qualities there, as there are in our Air, and then, why may not the Plannets have the like qualities as our Earth? and if so, then 'tis more probable, that they are made

made by the Ordinary way of Nature, as they are with us, and consist of such Exhalations from the Bodies of the Planets, as being very much rarified, may be drawn up, through the Orb of gross Vaporous Air, that incompasses them. Nor is this a singular Opinion; but it seemed most likely to *Camillus Glorioſus. Th. Campanella*, *Fromondus*, with some others. But if you ask, whither shall all these Exhalations return? I Answer, every one into his own Planet. If it be again Objected, that then there will be so many Centers of Gravity, and each several Plannet will be a distinct World; I reply, we have not like probability concerning the rest; but yet, perhaps all of them are so, except the *Sun*, though *Cusanus*, and some others, think, there is one also; and later times have discovered some lesser Clouds moving round about him. But as for *Saturn*, he hath two Moons on each side. *Jupiter* hath four, that Incircle him with their Motion. Which are likewise Eclipsed by the Interposition of his Body, as the Moon is by our Earth. *Venus* is Observed to increase and decrease as the Moon. And this perhaps hath been noted by former Ages, as may be guest by that Relation of Saint *Austin* out of *Varro*. *Mars*, and all the rest, derive their Light from the *Sun*. Concerning *Mercury*, there hath been little or no Observation, because, for the most part, he lies hid under the Sun-Beams, and seldom appears by himself. But when he

De Comet. l. 3. c. 4.
Apol. pro Galil.
Meteor. l. 3. c. 2. Art. 6.
Leſſius. Juſt. l. 3. c. 23.
De Civit. Dei l. 21. cap. 8.

he does, yet the compass of his Body is so little, and his Light of so clear a brightness, by reason of his nearness to the Sun, that the Perspective cannot make the same Discoveries upon him, as from the Rest.

So that if you Consider their Quantity, their Opacity, or these others Discoveries, you shall find it probable enough, that each of them may be a several World. Especially, since every one of them is allotted to a several Orbe, and not altogether in one, as the fixed Stars seem to be. But this would be too much for to Vent at the first: the Chief thing at which I now aim in this Discourse, is to Prove that there may be one in the Moon.

It hath been before Confirmed, that there was a Spheat of thick Vaporous Air Encompassing the Moon, as the First and Second Regions do this Earth. I have now shewed, that thence such Exhalations may Proceed as do Produce the Comets: Now from hence it may Probably follow, that there may be Wind also & Rain, with such other Meteors, as are common amongst us. This Consequence is so Dependant, that *Fromondus* dares not deny it, though he would (as he Confesses himself;) for if the Sun be able to Exhale from them such Fumes as may cause Comets, why not such as may cause Winds, why not then such also as may cause Rain, since I have above shewed, that there is Sea and Land, as with us?

De meteor. l. 3. c. 2. Art. 6.

Now

Now, Rain ſeems to be more Eſpecially Requiſite for them, ſince it may allay the Heat and Scorchings of the Sun, when he is over their Heads. And Nature hath thus Provided for thoſe in *Peru*, with the other Inhabitants under the Line.

But if there be ſuch great, and Frequent Alterations in the Heavens, why cannot we Diſcern them?

I Anſwer:

1. There may be ſuch, and we not able to Perceive them, becauſe of the Weakneſs of our Eye, and the Diſtance of thoſe places from us; they are the Words of *Fienus* (as they are quoted by *Fromondus* in the above cited place) *poſſunt maximæ permutationes in cælo fieri etiamſi a nobis non conſpiciantur; hoc viſus noſtri debilitas & immenſa cæli diſtantia faciunt.* And unto him Aſſents *Fromondus* himſelf, when a little after he ſayes, *Si in ſphæris planetarum degeremus, plurima forſan cæleſtium nebularum vellera toto æthere paſſim diſperſa videremus, quorum ſpecies jam evaneſcit nimiâ ſpatii intercapedine.* "If we did live in the "Sphears of the Plannets, we might "there perhaps Diſcern many great Clouds "Diſperſed through the whole Heavens, which are not now Viſible by Reaſon of this great Diſtance.

2. *Mæſlin* and *Keplar* Affirme, that they have ſeen ſome of theſe Alterations. The Words of *Mæſlin* are theſe (as I find them Cited.) *In eclipſi lunari veſpere Dominicæ Pal-*

Palmarum Anni 1605. *in corpore Lunæ versus Boream, nigricans quædam macula conſpecta fuit, obſcurior cætero toto corpore, quod candentis ferri figuram repreſentabat; dixiſſes nubila in multam regionem extenſa pluviis & tempeſtuoſis imbribus gravida, cujuſmodi ab excelſorum montium jugis in humiliora convallium loca videre non raro contingit.* "In that Lunary Eclipſe which "happened in the Even of Palm-Sunday, "in the Year 1605, there was a certain "Blackiſh Spot diſcerned in the Northerly "part of the Moon, being Darker than "any other place of her Body, and Re- "preſenting the Colour of Red Hot Iron; "You might Conjecture that it was "ſome Dilated Cloud, being Pregnant "with Showers; for thus do ſuch lower "Clouds appear from the Tops of high "Mountains.

Diſſert. 2. cum nunc. Galil. item. Somn. Aſtron. nota ultima.

And a little before this Paſſage, the ſame Author ſpeaking of that Vaporous Air about the Moon, tells us. *Quod circumfluus ille ſplendor diverſis temporibus apparet limpidior plus minuſve.* That it does at divers times appear of a Different Clearneſs, ſometimes more, and ſometimes leſs; which he Gueſſes to ariſe from the Clouds and Vapours that are in it.

Unto this I may add another Teſtimony of *Bapt. Ciſatus*, as he is Quoted by *Nicrembergius*, Grounded upon an Obſervation taken 23 Years after this of *Mæſlin*, and Writ to this *Euſeb. Nieremberg.* in a Letter

Letter by that Diligent and Judicious Aſtronomer. The Words of it Run thus; *Et quidem in eclipſi nupera ſolari quæ fuit ipſo die natali Chriſti, obſervavi clare in luna ſoli ſuppoſita, quidpiam quod valde probat id ipſum quod Cometæ quoque & maculæ ſolares urgent, nempe cœlum non eſſe à tenuitate & variationibus aeris exemptum; nam circa lunam adverti eſſe ſphæram ſeu orbem quendam vaporoſum, non ſecus atque circum terram, adeoq; ſicut ex terra in aliquam uſque ſphæram vapores & exhalationes expirant, ita quoque ex luna.* "In that late Solary E- "clipſe which happened on Chriſtmas Day, "when the Moon was juſt under the Sun, "I plainly Diſcerned that in her, which may "clearly Confirm what the Comets and "Suns Spots do ſeem to Prove, *viz.* that "the Heavens are not ſo Solid, nor Freed "from thoſe Changes which our Air is "liable unto; for, about the Moon I Per- "ceived ſuch an Orb, or Vaporous Air, "as that is which doth Encompaſs our "Earth; and as Vapours and Exhala- "tions are raiſed from our Earth into "this Air, ſo are they alſo from the "Moon. *Hiſt. nat. l. 2. c. 11.*

You ſee what Probable Grounds, and plain Teſtimonies I have brought for the Confirmation of this Propoſition: many other things in this behalf might be Spoken, which for Brevity ſake I now Omit, and Paſs unto the Next.

PROP. XIII.

That tis Probable there may be Inhabitants in this other World, but of what kind they are, is Uncertain.

I Have already Handled the Seasons, and Meteors belonging to this New World: tis Requisite that in the next place, I should come unto the Third thing which I Promised, and say somewhat of the Inhabitants; Concerning whom there might be many Difficult Questions raised; as, whether that place be more Inconvenient for Habitation than our World (as *Keplar* thinks;) whether they are the Seed of *Adam*, whether they are there in a Blessed Estate, or else what means there may be for their Salvation? with many other such Uncertain Enquires, which I shall willingly Omit, leaving it to their Examination who have more Leisure and Learning

Learning, for the Search of such Particulars.

Being for mine own part Content only to set down such Notes belonging unto these, which I have Observed in other Writers. *Cum tota illa regio nobis ignota sit, remanent inhabitatores illi ignoti penitus* (saith *Cusanus*) since we know not the Regions of that place, we must be altogether Ignorant of the Inhabitants There hath not yet been any such Discovery Concerning these, upon which we may Build a Certainty, or good Probability: well may we Guess at them, and that too very Doubtfully, but we can know nothing; for, *if we do hardly guess aright at things which be upon Earth, if with Labour we do find the things that are at Hand, How then can we Search out those things that are in Heaven?* What a Little is that which we know, in Respect of those many Matters Contained within this great Universe? This whole Globe of Earth and Water, though it seem to us to be of a Large Extent, yet it Bears not so great a Proportion unto the whole Frame of Nature, as a small Sand doth unto it; and what can such little Creatures as we, Discern, who are Tied to this Point of Earth? or what can they in the Moon know of us? *If we understand any thing* (saith *Esdras*) *'tis nothing but that which is upon the Earth; and he that Dwelleth above in the Heavens,*

De doct. ignorantia. l. 2. c. 12.

Wisd. 9. 16.

2 Esd. 4. 21.

may only Understand the things that are above in the Height of the Heavens.

So that 'twere a very Needless thing for us to Search after any Particulars; however, we may Guess in the General that there are some Inhabitants in that Plannet: for why else did Providence Furnish that place with all such Conveaniences of Habitation as have been above Declared?

But you will say, perhaps; is there not too great and Intolerable a Heat, since the Sun is their Zenith every Month, and doth tarry there so long before he Leavs it?

I Answer,

1. This may, Perhaps, be Remedied (as it is under the Line) by the Frequency of Mid-Day Showers, which may Cloud their Sun, and Cool their Earth.

2. The Equality of their Nights doth much Temper the Scorching of the Day; and the Extream Cold that comes from the one, Requires some space before it can be Dispelled by the other, so that the Heat Spending a great while before it can have the Victory, hath not afterwards much time to Rage in. Wherefore notwithstanding this Doubt, yet that place may Remain Habitable. And this was the Opinion of the *Cardinal de Cusa*, when speaking of this Plannet, he says, *Hic locus Mundi est habitatio hominum & animalium*

De doct. ign. l. 2. c. 12.

malium atque vegetabilium. "This part "of the World is Inhabited by Men, and "Beasts, and Plants. To him Assented *Campenella*; but he cannot Determine whether they were Men or rather some other kind of Creatures. If they were Men, then he thinks they could not be Infected with *Adams* Sin; yet Perhaps, they had some of their own, which might make them liable to the same Misery with us, out of which, it may be, they were Delivered by the same means as we, the Death of Christ; and thus he thinks that place of the *Ephesians* may be Interpreted, where the Apostle says, *God gathered all things together in Christ, both which are in Earth, and which are in the Heavens*: So also that of the same Apostle to the *Colossians*, where he says, that *it Pleased the Father to Reconcile all things unto himself by Christ, whether they be things in Earth, or things in Heaven.* *Ephes.* 1. 10. *Col.* 1. 20.

But I Dare not jest with Divine Truths, or apply these places according as fancy Directs. As I think this Opinion doth not any where Contradict Scripture: so I think likewise, that it cannot be Proved from it. Wherefore *Campanella's* Second Conjecture may be more Probable, that the Inhabitants of that World, are not Men as we are, but some other kind of Creatures which Bear some Proportion, and Likeness to our Natures. Or it may be, they are of a quite Different Nature

from any thing here Below, ſuch as no Imagination can Deſcribe; our Underſtandings being Capable only of ſuch things as have Entered by our Senſes, or elſe ſuch Mixed Natures as may be Compoſed from them. Now, there may be many other Species of Creatures beſide thoſe that are already known in the World; there is a great Chaſme betwixt the Nature of Men and Angels; It may be the Inhabitants of the Planets are of a Middle Nature between both theſe. 'Tis not Improbable that God might Create ſome of all Kinds, that ſo he might more Compleatly Glorifie himſelf in the Works of his Power and Wiſdom.

Cuſanus too, thinks they differ from us in many reſpects; I will ſet down his words as they may be found in the above Cited place, *Suſpicamur in regione ſolis magis eſſe ſolares, claros & illuminatos intellectuales habitatores, ſpiritualiores etiam quàm in lunâ, ubi magis lunatici, & in terra magis materiales & craſſi, ut illi intellectualis naturæ ſolares ſint multum in actu & parum in potentia, terreni verò magis in potentia, & parum in actu, lunares in medio fluctuantes. Hoc quidem opinamur ex influentia ignili ſolis, aquatica ſimul & aerea lunæ, & gravedine materiali terræ, & conſimiliter de aliis ſtellarum regionibus, ſuſpicantes nullam habitationibus carere, quaſi tot ſint partes particulares mundiales unius univerſi, quot ſunt ſtellæ quarum non eſt numerus,*

numerus, niſi apud eum qui omnia in numero creavit.

"We may Conjecture (ſaith he) the "Inhabitants of the Sun are like to the "Nature of that Plannet, more clear and "bright, more Intellectual than thoſe in "the Moon where they are nearer to the "Nature of that duller Plannet, and thoſe "of the Earth being more groſs and mate-"rial than either, ſo that theſe Intellectual "Natures in the Sun, are more form than "matter, thoſe in the Earth more matter "than form, and thoſe in the Moon betwixt "both. This we may gueſs from the Fie-"ry Influence of the Sun, the Watery and "Aereous Influence of the Moon, as alſo "the Material Heavineſs of the Earth. In "ſome ſuch manner likewiſe is it with the "Regions of the other Stars; for, we "Conjecture that none of them are with-"out Inhabitants, but that there are ſo "many particular Worlds and parts of "this one Univerſe, as there are Stars, "which are innumerable, unleſs it be to "him who Created all things in Num-"ber.

For he held that the Stars were not all in one equal Orb as we commonly ſuppoſe; but that ſome were far higher than others, which made them appear leſs; and that many others were ſo far above any of theſe, that they were altogether inviſible unto us. An Opinion which (as I con-

ceive)

ceive) hath not any great probability for it, nor certainty against it.

The Preist of *Saturn* relating to *Plutarch* (as he feigns it) the Nature of these Selenites, told him, they were of divers dispositions, some desiring to live in the lower parts of the Moon, where they might look downwards upon us, while others were more surely mounted aloft, all of them shining like the Rays of the Sun, and as being Victorious, are Crowned with Garlands made with the Wings of *Eustathia* or *Constancie*.

It hath been the Opinion amongst some of the Ancients, that their Heavens and Elysian Fields were in the Moon where the Air is most quiet and pure. Thus *Socrates*, thus *Plato*, with his followers, did esteem this to be the place where those purer Souls Inhabite, who are freed from the Sepulcher, and Contagion of the Body. And by the Fable of *Ceres*, continually wandring in search of her Daughter *Proserpina*, is meant nothing else but the longing desire of Men, who live upon *Ceres* Earth, to attain a place in *Proserpina*, the Moon or Heaven.

Nat. Com. l. 3. c. 19.

Plutarch also seems to assent unto this; but he thinks moreover, that there are two places of happiness answerable to those two parts which he Fancies to remain of a Man when he is Dead, the Soul and the Understanding; the Soul he thinks is made of the Moon; and as our Bodies do so proceed

ceed from the duſt of this Earth, that they ſhall return to it hereafter; ſo our Souls were generated out of that Planner, and ſhall be reſolved into it again; whereas the underſtanding ſhall aſcend unto the Sun, out of which it was made, where it ſhall poſſeſs an Eternity of well-being, and far greater happineſs than that which is enjoyed in the Moon. So that when a Man Dies, if his Soul be much polluted, then muſt it wander up and down in the middle Region of the Air, where Hell is, and there Suffer unſpeakable Torments for thoſe Sins whereof it is Guilty. Whereas the Souls of better Men, when they have in ſome Space of time been purged from that impurity which they did derive from the Body, then do they return into the Moon, where they are poſſeſt with ſuch a joy, as thoſe Men feel who profeſs holy Myſteries, from which place (ſaith he) ſome are ſent down to have the Superintendance of Oracles, being diligent either in the Preſervation of the good, either from, or in, all Perills, and the Prevention or Puniſhment of all Wicked Actions; but if in theſe Imployments they miſ-behave themſelves, then are they again to be impriſoned in a Body, otherwiſe they remain in the Moon, till their Souls be reſolved into it, and the underſtanding being cleared from all Impediments, aſcends to the Sun which is its proper place. But this requires a diverſe Space of time, according to the divers Affections

fections of the Soul. As for thoſe who have been Retired and Honeſt, addicting themſelves to a Studious and quiet Life, theſe are quickly preferred to a higher Happineſs. But as for ſuch who have buſied themſelves in many Broyls, or have been Vehement in the Proſecution of any Luſt, as the Ambitious, the Amorous, the Wrathful Man, theſe ſtill retain the Glimpſes and Dreams of ſuch things as they have performed in their Bodies, which makes them either altogether unfit to remain there, where they are, or elſe keeps them long ere they can put off their Souls. Thus you ſee *Plutarchs* Opinion concerning the Inhabitants and Neighbours of the Moon, which (according to the manner of the Academicks) he delivers in a Third Perſon; you ſee he makes that Plannet an Inferior kind of Heaven, and though he differ in many Circumſtances, yet doth he deſcribe it to be ſome ſuch Place, as we ſuppoſe Paradiſe to be. You ſee likewiſe his Opinion concerning the Place of the Damned Spirits, that it is in the middle Region of the Air; and in neither of theſe is he ſingular, but ſome more late and Orthodox Writers have agreed with him. As for the place of Hell, many think it may be in the Air, as well as any where elſe.

De Civit. Dei l. 22. *c.* 16.

True indeed, S. *Auſtin* affirms that this Place cannot be diſcovered; But others there are who can ſhew the Situation of it out of Scripture; Some holding it to be in another

another World without this, because our Saviour calls it ἐξώτερον outward darkneſs. But the moſt will have it placed towards the Center of our Earth, becauſe 'tis ſaid, Chriſt deſcended into the lower parts of the Earth; and ſome of theſe are ſo Confident, that this is its Situation, that they can deſcribe you its bigneſs alſo, and of what Capacity it is. *Francis Ribera* in his Comment on the *Revelations*, ſpeaking of thoſe words, where 'tis ſaid, *that the Bloud went out of the Wine-preſs, even unto the Horſes-Bridles by the ſpace of one Thouſand and Six Hundered Furlongs*, Interprets them to be meant of Hell, and that Number expreſſes the Diameter of its Concavity, which is 200 *Italian* Miles; But *Leſſius* thinks that this Opinion gives them too much Room in Hell, and therefore he gueſſes that 'tis not ſo wide; for (ſaith he) the Diameter of one League being Cubically multiplied, will make a Sphere capable of 800000 Millions of Damned Bodies, allowing to each ſix Foot in the Square; whereas (ſays he) 'tis certain, that there ſhall not be one Hundered Thouſand Millions in all that ſhall be damned. You ſee the bold *Jeſuit* was careful that every one ſhould have but Room enough in Hell, and by the ſtrangeneſs of the Conjecture, you may gueſs that he had rather be abſurd, than ſeem either uncharitable or ignorant. I remember there is a Relation in *Pliny*, how that *Dionyſiodorous* a Mathematician, being

Mat. 25. 30.

Eph. 4. 9.

Rev. 14. 20

De Morib. div. l. 13. c. 24.

Dead

Dead, did ſend a Letter from this place to ſome of his Friends upon Earth, to certifie them what diſtance there was betwixt the Center and Superficies: he might have done well to have prevented this Controverſie, and enformed them the utmoſt Capacity of that Place. However, certain it is, that that Number cannot be known; and probable it is, that the place is not yet determined, but that Hell is there where there is any Tormented Soul, which may be in the Regions of the Air, as well as in the Center: And therefore perhaps it is, that the Devil is ſtiled the Prince of the Air. But of this only occaſionally, and by reaſon of *Plutarchs* Opinion concerning thoſe that are round about the Moon; as for the Moon it ſelf, he eſteems it to be a lower kind of Heaven, and therefore in another place he calls it a Terreſtrial Star, and an Olympian or Celeſtial Earth; anſwerable, (as I conceive) to the Paradiſe of the School-Men. And, that Paradiſe was either in, or near the Moon, is the Opinion of ſome later Writers, who derived it (in all likely-hood) from the Aſſertion of *Plato*, and perhaps, this of *Plutarch*. *Teſtatus* lays this Opinion upon *Iſiodor*, *Hiſpalenſis*, and the Venerable *Bede*; and *Pererius* Fathers it upon *Strabus* and *Rabanus* his Maſter. Some would have it to be Situated in ſuch a place as could not be diſcovered, which cauſed the Pen-Man of *Eſdraſs* to make it a harder matter *to know the outgoings of Paradiſe,*

Cur ſilent oracula.

Sir W Raw. l. 1. c. 3. ſect. 7.

In Geneſ.

radise, than to weigh the weight of the Fire, or Measure the Blasts of Wind, or call again a Day that is past. 2 Esdr. 4. 7. But notwithstanding this, there be some others, who think, that it is on the Top of some high Mountain under the Line; and these interpreted the Torrid Zone to be the Flaming Sword whereby Paradise was guarded. 'Tis the consent of divers others, that Paradise is Situated in some high and Eminent Place. So *Tostatus*: *Est etiam Paradisus situ altissima, supra omnem terræ altitudinem,* "Paradise is Situated in some high place above "the Earth: and therefore in his Comment upon the 49 of *Genesis*, he understands the Blessing of *Jacob*, concerning the everlasting Hills to be meant of Paradise, and the Blessing it self to be nothing else but a Promise of Christs coming, by whose Passion the Gates of Paradise should be opened. Unto him assented *Rupertus*, *Scotus*, and most of the other School-Men, as I find them Cited by *Pererius*, and out of him in Sir *Walter Rawleigh*. Their reason was this: because in probability, this place was not overflowed by the Flood, since there were no Sinners there, which might draw that Curse upon it. Nay, *Tostatus* thinks, that the Body of *Enoch* was kept there; and some of the Fathers, as *Tertullian* and *Austin*, have affirmed, that the Blessed Souls were reserved in that place till the Day of Judgment; and therefore 'tis likely that it was not overflowed by the Flood, it were easie

In Genes.

Comment. in 2. Gen. v. 8. l. 1. c. 3. sect. 6. 7.

to

to produce the Unanimus consent of the Fathers, to prove that Paradise is yet really Existent. Any diligent perufer of them, may eafily obferve how they do generally Interpret the Paradise whereto Saint *Paul* was wrapt, and that wherein our Saviour promised the Thief should be with him, to be locally the same from whence our first Parents were Banished. Now there cannot be any Place on Earth designed where this should be: And therefore it is not altogether improbable that it was in this other World.

2 *Cor.* 12. 4. *Luke* 23. 43.

And besides, since all Men should have went Naked if *Adam* had not Fell, 'tis Requesite therefore that it should be Situated in some such place where it might be Priviledged from the Extremities of Heat and Cold. But now this could not be (they thought) so Conveniently in any Lower, as it might in some higher Air. For these and such like Considerations, have so many Affirmed, that Paradise was in a high Elevated place. Which some have Conceived could be nowhere but in the Moon: For it could not be in the Top of any Mountain; nor can we think of any other Body Separated from this Earth, which can be a more Convenient place for Habitation than this Planner; therefore they Concluded that it was there.

It could not be on the Top of any Mountain.

Gen. 7. 19. 1. Because we have Expres Scripture,

ture, that the Higheſt of them was Overflowed.

2. Becauſe it muſt be of a greater Extenſion, and not ſome ſmall Patch of Ground, ſince tis likely all Men ſhould have Lived there, if *Adam* had not Fell. But for a Satisfaction of the Arguments, together with a Farther Diſcourſe of Paradiſe, I ſhall Refer you to thoſe who have Written Purpoſely upon this Subject. Being content for my own part to have ſpoken ſo much of it, as may Conduce to ſhew the Opinion of others Concerning the Inhabitants of the Moon; I dare not my ſelf Affirm any thing of theſe *Selenites*, becauſe I know not any Ground whereon to Build any Probable Opinion. But I think that Future Ages will Diſcover more; and our Poſterity, Perhaps, may Invent ſome means for our better Acquaintance with theſe Inhabitants.

PROP.

PROP. XIV.

That 'tis Possible for some of our Posterity, to find out a Conveyance to this other World, and if there be Inhabitants there, to have Commerce with them.

ALL that hath been said, Concerning the People of the New World, is but Conjectural, and full of Uncertanties; nor can we ever look for any Evident or more Probable Discoveries in this kind, unless there be some hopes of Inventing means for our Conveyance thither. The Possibility of which, shall be the Subject of our Enquiry in this last Proposition.

And, if we do but Consider by what Steps and Leasure, all Arts do usually rise to their Growth, we shall have no cause to Doubt why this also may not here-

hereafter be found out amongſt other Secrets. It hath Conſtantly yet been the Method of Providence, not preſently to ſhew us all, but to Lead us on by Degrees, from the Knowledg of one thing to another.

'Twas a great While, ere the Plannets were Diſtinguſhed from the fixed Stars, and ſome time after that, ere the Morning and Evening Star were Found to be the ſame. And in greater ſpace (I doubt not) but this alſo, and other as Excellent Myſteries will be Diſcovered. Time, who hath always been the Father of new Truths, and hath Reveiled unto us many things, which our Anceſtors were Ignorant of, will alſo Manifeſt to our Poſterity, that which we now deſire, but cannot know. *Veniet tempus* (ſaith *Seneca*) *quo iſta quæ nunc latent, in lucem dies extrahet, & longioris ævi diligentia.* Time will come, when the Indeavours of after Ages, ſhall bring ſuch things to Light as now lie hid in Obſcurity. Arts are not yet come to their Solſtice. But the Induſtry of Future Times, Aſſiſted with the Labours of their Fore-Fathers, may reach that Height which we could not Attain to. *Veniet tempus quo poſteri noſtri nos tam aperta neſciſſe mirentur.* As we now wonder at the Blindneſs of our Anceſtors, who were not able to Diſcern ſuch things, as ſeem Plain and Obvious unto us, ſo will our Poſ-

Nat. Qu. l. 7. cap. 25.

ſterity, Admire our Ignorance in as Perſpicuous matters.

In the firſt Ages of the World the Iſlanders thought themſelves either to be the only Dwellers upon Earth, or elſe if there were any other, they could not poſſible Conceive how they might have any Commerce with them, being Severed by the Deep and Broad Sea. But after times Found out the Invention of Ships, in which notwithſtanding, none but ſome bold, Daring Men Durſt Venture, according to that of the Tragœdian.

Sen. Med. act. 1. *Audax nimium qui freta primus*
Vide Hora. Od. 3. *Rate tam fragili perfida rupit.*
Juvenal. ſat. 12. Too Bold was he, who in a Ship ſo Frail,
Claud. præf. ad lib. de rap. Proſer. Firſt Ventur'd on the Trecherous Waves to [Sail.

And yet now, how eaſie a thing is this even to a Timorous and Cowardly Nature? And Queſtionleſs, the Invention of ſome other means for our Conveyance to the Moon, cannot ſeem more Incredible to us, than this did at firſt to them, and therefore we have no juſt Reaſon to be Diſcouraged in our Hopes of the like Succeſs.

Yea, but (you will ſay) there can be no Sayling thither, unleſs that were True which the Poets do but Fain, that ſhe made her Bed in the Sea. We have not now any *Drake*, or *Columbus*, to Undertake this Voyag, or any *Dædalus* to Invent a Conveyance through the Air.

I Anſwer,

I Answer, Though we have not, yet why may not Succeeding times, Raise up some Spirits as Eminent for new Attempts and Strange Inventions, as any that were before them? 'Tis the Opinion of *Keplar*, that as soon as the art of Flying is Found out, some of their Nation will make one of the first Colonies, that shall Transplant into that other World. I Suppose, his Appropriating this Preheminence to his own Cuntry-Men, may arise from an Overpartial Affection to them. But yet thus far I Agree with him, That when ever that Art is Invented, or any other, whereby a Man may be Conveyed some Twenty Miles high, or thereabouts, then, 'tis not altogether Improbable that some or other may be Successful in this Attempt. *Dissert. cum Nun. Syder.*

For the better Clearing of which, I shall first lay Down, and then Answer those Doubts that may make it seem utterly Impossible.

These are Chiefly Three.

The First, taken from the Natural Heavinesse of a Mans Body, whereby it is made Unfit for the Motion of Ascent, together with the Vast Distance of that Place from us.

2. From the Extream Coldness of the Æthereal Air.

3. The Extream Thinness of it.

Both which must needs make it Impas-

ſible, though it were but as many Single Miles thither, as it is Thouſands.

For the Firſt, Though it were Suppoſed that a Man could Fly, yet we may well think he would be very Slow in it, ſince he hath ſo Heavy a Body, and ſuch a one too, as Nature did not Principally Intend, for that kind of Motion. 'Tis uſually Obſerved, that amongſt the Variety of Birds, thoſe which do moſt Converſe upon the Earth, and are Swifteſt in their Running, as a Pheaſant, Partridg, *&c.* together with all Domeſtical Fowl, are leſs able for Flight, than others, which are for the moſt part upon the Wing, as a Swallow, Swift, *&c.* And therefore we may well think, that Man being not Naturally Endowed with any ſuch Condition as may Inable him for this Motion, and being Neceſſarily tied to a more Eſpecial Reſidence on the Earth, muſt needs be Slower than any Fowl, and leſs Able to hold out. Thus is it alſo in Swiming; which Art, though it be Grown to a good Eminence, yet he that is beſt Skiled in it, is not Able, either for Continuance, or Swiftneſs, to equal a Fiſh; Becauſe he is not Naturally Appointed to it. So that though a Man could Fly, yet he would be ſo Slow in it, and ſo Quickly Weary, that he could never think to Reach ſo great a Journey as it is to the Moon.

But Suppoſe with all, that he could Fly as

as Fast, and Long, as the Swifteſt Bird; yet it cannot Poſſibly be Conceived, how he ſhould ever be Able to paſs through ſo vaſt a Diſtance, as there is betwixt the Moon and our Earth. For this Plannet, according to the common Grounds, is uſually Granted to be at the Leaſt, 52 Semidiameters of the Earth from us. Reckoning for each Semidiameter 3456 Engliſh Miles, of which the whole ſpace will be about 179712.

So that though a Man could Conſtantly keep on in his Journey thither by a Strait Line, though he could Fly a Thouſand Miles in a Day; yet he would not Arrive thither under 180 Days, or Half a Year.

And how were it Poſſible for any to Tarry ſo long without Dyet or Sleep?

1. For Diet. I Suppoſe there could be no Truſting to that Fancy of *Philo* the *Jew* (mentioned before) who thinks, that the Muſick of the Sphears ſhould Supply the Strength of Food. *Prop.* 3.

Nor can we well Conceive, how a Man ſhould be Able to Carry ſo much Luggage with him, as might ſerve for his *Viaticum* in ſo Tedious a Journey.

2. But if he could: yet he muſt have ſome time to Reſt and Sleep in. And I beleive he ſhall Scarce find any Lodgings by the Way. No Inns to Entertain Paſſengers, nor any Caſtles in the Air (unleſs they be Inchanted ones) to Receive

Poor Pilgrims or Errant Knights. And ſo Conſequently, he cannot have any Poſſible hopes of Reaching thither.

Notwithſtanding all which Doubts, I ſhall lay down this Poſition.

That Suppoſing a Man could Fly, or by any other means, raiſe himſelf Twenty Miles upwards, or thereabouts, it were Poſſible for him to come unto the Moon.

As for thoſe Arguments of the firſt kind, that ſeem to overthrow the Truth of this, they Proceed upon a wrong Ground. Whilſt they Suppoſe, that a Condenſed Body, in any place of the Air, would always Retain in it a ſtrong Inclination of Tending Down-wards, towards the Center of this Earth. Whereas 'tis more Probable, that if it were but ſomewhat above this Orb of Vaporous Air, it might there reſt Immoveable, and would not have in it any Propenſion to this Motion of Deſcent.

For the better Illuſtration of this, you muſt know, that the Heavineſs of a Body or (as *Ariſtotle* defines it) the proneneſs of it to tend down unto ſome Center, is not any abſolute quality Intrinſical unto it, as if, where-ever the Body did retain its Eſſence, it muſt alſo retain this quality: or as if Nature had implanted in every condenſed Body *Appetitionem centri, & fugam extremitatis.* Such a Love to the Center and Hatred to the Extremities. Becauſe one of theſe being leſs than a quantity, and

De cælo lib. 4. cap. 1.

the

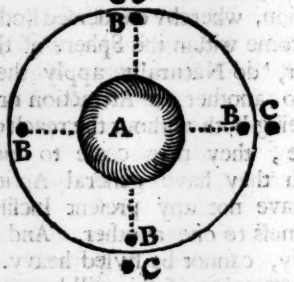
the other no more, cannot have any Power of Attraction or Depulsion in them. According to that Common Principle *Quantitatis nulla est efficacia.*

But now the True Nature of Gravity is this. 'Tis such a respective mutual desire of Union, whereby condensed Bodies, when they come within the Sphere of their own Vigour, do Naturally apply themselves, one to another by Attraction or Coition. But being both without the reach of eithers Vertue, they then cease to move, and though they have general Aptitude, yet they have not any present Inclination or proneness to one another. And so consequently, cannot be styled heavy.

* A magnetical natural attraction. So *Keplar Somn. Astron.* N. 66. *Coper. l.* 1. *cap.* 26. *Foscarin in epist. ad Sebast. Fantonum.*

The meaning of this will be more clearly Illustrated by a Similitude. As any Light Body (suppose the Sun) does send forth his Beams in an Orbicular form; So likewise any Magnetical Body, for Instance, a round Load-stone does cast Abroad his Magnetical Vigour in a Sphere. Thus.

Gilbert. de Magnete. l. 2. *cap.* 7.



Where ſuppoſe the inward Circle at A, to repreſent the Load-ſtone, and the outward one betwixt B C, the Orb that does terminate its Vertue.

Now any other Body that is like affected coming within this Sphere, as B, will preſently deſcend towards the Center of it, and in that reſpect may be ſtiled heavy. But Place it without this Sphear as C, and then the deſire of Union ceaſeth, and ſo conſequently the Motion alſo.

To apply then what hath been ſaid. This great Globe of Earth and Water, hath been proved by many Obſervations, to partici-

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pate of Magnetical properties. And as the Load-ſtone does caſt forth its own Vigour round about its Body, in a Magnetical compaſs: So likewiſe does our Earth. The difference is, that it is another kind of Affection which cauſes the Union betwixt the Iron and Load-ſtone, from that which makes Bodies move unto the Earth. The former is ſome kind of nearneſs and Similitude in their Natures, for which Philoſophy as yet has not found a particular Name. The latter does ariſe from that peculiar quality, whereby the Earth is properly diſtinguiſhed from the other Elements, which is its Condenſity. Of which the more any thing does participate, by ſo much the ſtronger will be the deſire of Union to it. So Gold and others Metals, which are moſt cloſe in their Compoſition, are likewiſe moſt ſwift in their Motion of diſcent.

And though this may ſeem to be contradicted by the inſtance of Metalls, which are of the ſame weight, when they are melted, and when they are hard: As alſo of Water, which does not differ in reſpect of Gravity, when it is frozen, and when it is Fluid: yet we muſt know, that Metalls are not rarified by Melting, but mollified, And ſo too, for frozen Waters; they are not properly condenſed, but congealed into a harder Subſtance, the parts being not contracted cloſer together, but ſtill poſſeſſing the ſame Extention. But yet (I ſay) 'tis very probable, that there is ſuch

ſuch a Sphere about the Earth, which does terminate its Power of Attracting other things unto it. So that ſuppoſe a Body to be placed within the Limits of this Sphere, and then it muſt needs tend downwards, towards the Center of it. But on the contrary, if it be beyond this compaſs, then there can be no ſuch Mutual Attraction; and ſo conſequently, it muſt reſt Immoveable from any ſuch Motion.

For the farther Confirmation of this, I ſhall propoſe two Pertinent Obſervations.

The firſt taken in the preſence of many Phyſitians, and related by an Eminent Man in that Profeſſion, *Hieron. Fracaſtorius.* There being divers Needles provided of ſeveral kinds, like thoſe in a Mariners Chart, they found, that there was an Attractive Power, not only in the magnet; But that Iron alſo and Steel, and Silver did each of them draw its own Mettle. Whence he concludes, *Omne trahit quod ſibi ſimili eſt.* And as theſe peculiar likeneſſes, have ſuch a Mutual Efficacy; ſo 'tis porbable, that this more general qualification of condenſity, may be the cauſe, why things ſo affected deſire Union to the Earth. And though 'tis likely that this would appear betwixt two leſſer condenſed Bodies, (as ſuppoſe two peices of Earth) if they were both placed at Liberty in the Æthereal Air, yet being near the Earth, the ſtronger ſpecies

Lib. de Sympath. & Antip. cap. 7.

Vid. Bapt. Maſul. exer. Acad. de attract. exer. 4.

cies of this great Globe does as it were drownd the leſs.

Tis a Common Experiment, that ſuch a Lump of Ore or Stone, as being on the Ground, cannot be moved by leſs than ſix Men, being in the bottom of a deep Mine, may be ſtirred by two. The reaſon is, becauſe then 'tis compaſſed with Attractive Beams, there being many above it, as well as below it. Whence we may probably Infer (ſaith the Learned *Virulam*) "that the Nature of Gravity, does "work but weakly, alſo far from the Earth; "Becauſe the Appetite of Union in Denſe "Bodies, muſt be more dull in reſpect of "diſtance, As we may alſo conclude from the Motion of Birds, which riſe from the ground but heavily, though with much Labour; Whereas being on high, they can keep themſelves up, and *Soar* about by the meer extenſion of their Wings. Now the Reaſon of this difference, is not (as ſome falſly conceive) the depth of Air under them. For a Bird is not heavier when there is but a Foot of Air under him, than when there is a Furlong. As appears by a Sip in the Water, (an inſtance of the ſame Nature) which does not ſink deeper, and ſo conſequently is not heavier, when it has but Five Fatham depth, than when it has Fifty. But the true reaſon is, the weakneſs of the deſire of Union in Denſe Bodies at a diſtance, *Nat Hiſt. Cent. 1. exper. 33.*

So that from hence, there might be juſt

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occaſion to Tax *Ariſtotle* and his followers, for Teaching, that heavineſs is an abſolute quality of it ſelf, and really diſtinct from condenſity: whereas it is only a Modification of it, or rather, another Name given to a Condenſed Body, in reference to its Motion.

For if it were abſolute, then it ſhould always be Inherent in its Subject, and not have its Eſſence depend upon the Bodies being here or there. But it is not ſo. For,

1. Nothing is heavy in its proper place, according to his own Principle, *Nihil grave eſt in ſuo loco.* And then,

2. Nothing is heavy, which is ſo far diſtant from that proper Orb to which it does belong, that it is not within the reach of its Vertue. As was before confirmed.

But unto this it may by Objected. Though a Body being ſo placed, be not heavy *in actu ſecundo*; yet it is *in actu primo*: becauſe it retains in it an inward proneſs to move downwards, being once ſevered from its proper Place. And this were reaſon enough, why the quality of heavineſs ſhould have an abſolute being.

I Anſwer, This diſtinction is only appliable to ſuch Natural Powers as can ſuſpend their Acts; and will not hold in Elementary qualities, whoſe very Eſſence does neceſſarily require an exerciſe of the ſecond Act, as you may eaſily diſcern by an Induction of all the reſt. I cannot ſay, that Body has in it the quality of Heat, Coldneſs, Drineſs,

neſs, Moiſture, Hardneſs, Softneſs, &c. Which for the preſent, has not the ſecond Act of theſe qualities. And if you mean by the Eſſence of them, a Power unto them: why, there is not any Natural Body but has a Power to them all.

From that which hath been ſaid concerning the Nature of Gravity, it will follow; That if a Man were above the Sphere of this Magnetical Vertue, which proceeds from the Earth, he might there ſtand as firmly as in the open Air, as he can now upon the ground: And not only ſo, but he may alſo move with a far greater ſwiftneſs, than any living Creatures here below, becauſe then he is without all Gravity, being not attracted any way, and ſo conſequently will not be liable to ſuch Impediments, as may in the leaſt manner reſiſt that kind of Motion which he ſhall apply himſelf unto.

If you yet enquire, how we may conceive it poſſible, that a Condenſed Body ſhould not be heavy in ſuch a place.

I Anſwer, By the ſame reaſon, as a Body is not heavy in its proper Place. Of this I will ſet down Two Inſtances.

1. When a Man is in the Bottom of a deep River, though he have over him a Multitude of heavy Waters, yet he is not burdened with the weight of them. And though another Body, that ſhould be but of an equal Gravity, with theſe Waters, when

when they are taken out, would be heavy enough to press him to Death; yet notwithstanding whilst they are in the Channel, they do not in the least manner, Crush him with their Load. The reason is, because they are both in their right places; and 'tis proper for the Man being the more Condensed Body, to be lower than the Waters. Or rather thus, Because the Body of the Man, does more nearly agree with the Earth, in this Affection, which is the ground of its Attraction, and therefore doth that more strongly attract it, than the Waters that are over it. Now, as in such a case, a Body may lose the Operation of its Gravity, which is, to move, or to press downwards: So may it likewise, when it is so far out of its place, that this Attractive Power cannot reach unto it.

* *Phys. l. 3. Q. 6. art. 2.* * *Viridar. l. 4. Prob: 47.*

Vide. Arch. l. de insidentibus. humido.

'Tis a Pretty Notion to this Purpose, Mentioned by * *Albertus de Saxonia*, and out of him by * *Francis Mendoca*; That the Air is in some part of it Navigable. And that upon this Starick Principle; any Brass or Iron Vessel (Suppose a Kettle) whose Substance is much Heavier than that of the Water, yet being Filled with the Lighter Air, it will Swim upon it, and not Sink. So Suppose a Cup, or Wooden Vessel, upon the outward Borders of this Elementary Air, the Cavity of it being filled with Fire, or rather Æthereal Air, it must Necessarily upon the same Ground Remain Swimming there, and of it self can

can no more Fall, than an Empty Ship can Sink.

'Tis commonly granted, that if there were a Hole quite through the Center of the Earth, though any Heavy Body (as Suppoſe a Milſtone) were let Fall into it, yet when it came unto the place of the Center, it would there reſt Immoveable in the Air. Now, as in this Caſe, its own Condenſity, cannot hinder, but that it may Reſt in the Open Air, when there is no other Place, to which it ſhould be Attracted: So neither could it be any Impediment unto it, if it were placed without the Sphere of the Earths Magnetical Vigor, where there ſhould be no Attraction at all.

From hence then (I ſay) you may Conceive, that if a Man were beyond this Sphere, he might there ſtand as firmly in the Open Air, as now upon the Earth. And if he might Stand there, why might he not alſo Go there? And if ſo; then there is a Poſſibility likewiſe of having other Conveniances for Travelling.

And here 'tis Conſiderable, that ſince our Bodys will then be Devoid of Gravity, and other Impediments of Motion; we ſhall not at all Spend our ſelves in any Labour, and ſo Conſequently not much need the Reparation of Diet: But may perhaps Live altogether without it, as thoſe Creatures have done; who by Reaſon of their Sleeping for many Days together

gether, have not ſpent any Spirits, and ſo not wanted any Food: which is commonly related of Serpents, Crocodiles, Bears, Coockoes, Swallows, and ſuch like. To this Purpoſe, * *Mendoca* reckons up divers ſtrang Relations. As that of *Epimenides*, who is Storied to have Slept 75 Years. And another of a Ruſtick, in *Germany*, who being Accedentally covered with a Hay-Rick, Slept there for all Autumn, and the Winther following, without any Nouriſhment.

*Viridar. lib. 4 prob. 24.

Or, if this will not ſerve, yet why may not a Papiſt faſt ſo long, as well as *Ignatius* or *Xaverius*? Or if there be ſuch a ſtrange Efficacy in the Bread of the Euchariſt, as their Miraculous Relations do Attribute to it: why then, that may ſerve well enough, for their *Viaticum*.

Or, if we muſt needs Feed upon ſomething elſe, why may not Smells Nouriſh us? * *Plutarch*, and * *Pliny* and Divers other Ancients, tell us of a Nation in *India* that lived only upon Pleaſing Odors. And 'tis the Common Opinion of Phyſitians, that theſe do ſtrangely both Strengthen and Repair the Spirits. Hence was it that *Democritus* was Able for divers Days together to Feed himſelf with the meer Smel of Hot Bread.

*De facie in Luna.
*Nat. hiſt. lib. 7. ca. 2.

Diog. Laert. lib. 1. ca. 9.

Or if it be Neceſſary that our Stomacks muſt Receive the Food: why then, 'tis not Impoſible, that the Purity of the Æthereal

real Air, being not mixed with any Improper Vapours, may be so Agreeable to our Bodys, as to yeeld us sufficient Nourishment; According to that of the Poet;

——*Vescitur aura*
Æthere——— *Virgil.*

'Twas an Old *Platonick* Principle, that there is in some part of the World such a place where Men might be Plentifully Nourished, by the Air they Breath: Which cannot more Properly be Affigned to any one Particular, than to the Æthereal Air above this.

I know 'tis the common Opinion, that no *Element* can prove *Aliment*, because 'tis not Proportionate to the Bodys of living Creatures which are Compounded. But, *Arist. de Sens. cap. 5.*

1. This Æthereal Air is not an Element; and though it be purer, yet 'tis perhaps of a greater Agreeableness to Mans Nature and Constitution.

2. If we consult Experience and the credible Relations of others, we shall find it Probable enough that many things Receive Nourishment from meer Elements.

First, for the Earth; * *Aristotle* and * *Pliny*, those two great Naturalists, tell us of some Creatures, that are Fed only with this. And it was the Curse of the Serpent, *Gen.* 3. 14. *Upon thy Belly shalt thou go, and Dust shalt thou Eat all the Days of thy Life.* The Earth

*Hist. Animal. lib. 8. cap. 5.
*Hist. l. 10. cap. 72.

So likewise for the Water. * *Albert*[us] *Magnus* speaks of a Man who Lived seven Weeks together by the meer Drinking of Water. * *Rondoletius* (to whose Diligence these later Times are much beholding for sundry Observations concerning the Nature of Aquatils) Affirms, that his Wife did keep a Fish in a Glass of Water, without any other Food, for Three Years; In which space it was Constantly Augmented, till at first it could not come out of the place at which it was put in, and at length was too Big for the Glass it selfe, though that were of a large Capacity. *Cardan* tells us of some Worms, that are Bred and Nourished by the *Snow*, from which being once Separated, they Dye.

The Water

*De Anim. lib. 7.

*De Pisc. l. 1. cap. 12.

*Subtil. l. 9.

Thus also is it with the Air, which we may well Conceive does Chiefly Concur to the Nourishing of all Vegetables. For if their Food were all Sucked out from the Earth, there must needs be then, some sensible decay in the Ground by them; Especially, since they do every Year renew their Leaves, and Fruits: which being so many, and so often, could not be Produced without Abundance of Nourishment. To this Purpose is the Experiment of Trees cut down, which will of themselves put fourth Sprouts. As also that of *Onyons*, and the *Semper-vive*, which will strangely shoot Forth, and Grow as they hang in the open Air. Thus likewise is it with some Sensible Creatures; the

The Air

the *Camelion* (saith * *Pliny* and * *Solinus*) is meerly Nourished by this: And so are the Birds of Paradise, Treated of by * many; which reside Constantly in the Air. Nature having not bestowed upon them any Legs, and therefore they are never seen upon the Ground, but being Dead. If you ask, how they Multiply? 'Tis Answered, they lay their Eggs on the Backs of one another, upon which they Sit till their Young Ones be Fledg'd. * *Rondoletius* from the History of *Hermolaus Barbarus*, tells us of a Priest (of whom one of the Popes had the Custody) that Lived Forty Years upon meer Air. As also of a Maid in *France*, and another in *Germany*, that for divers Years together did Feed on nothing but this: Nay, he Affirms, that he himself had seen one, who Lived till Ten Years of Age, without any other Nourishment. You may find most of these, and some other Examples to this purpose, gathered together by *Mendoca Viridar. lib.* 4. *Prob.* 23, 24. Now, if this Elementary Air which is mixed with such Improper Vapors, may Accidentally Nourish some Persons; Perhaps then, that pure Æthereal Air may of it self be more Natural to our Tempers.

But if none of these Conjectures may Satisfie; yet there may Happily be some Possible means for the Conveiance of other Food, as shall be shewed afterwards.

* *Hist. li.* 8 *cap.* 33.
* *Polyhistor. cap.* 53.
* *Lop. hist. Ind. Occid. cap.* 96.
Majolus Colloq. 3. 'Tis likely that these Birds do cheifly reside in the Æthereal Air, where they are nourished and upheld.
* *De Piscibus. lib.* 1. *cap.* 13.

Again, seeing we do not then Spend our selves in any Labour, we shall not, it may be, need the Refreshment of Sleep. But if we do, we cannot desire a Softer Bed than the Air, where we may Repose our selves Firmly and Safely as in our Chambers.

But here you may ask, whether there be any means for us to know, how far this Sphere of the Earths Vertue does Extend it self?

I Answer, 'tis Probable that it does not reach much farther than that Orb of thick Vaporous Air, that Incompasseth the Earth; because 'tis likely the Sun may Exhale some Earthly Vapors, near unto the utmost bounds of the Sphere allotted to them.

Now there are divers ways used by Astronomers, to take the altitude of this Vaporous Air. As,

1. By Observing the height of that Air which causeth the *Crepusculum*, or Twilight; For the finding of which, the Antients used this means: As soon as ever they could Discern the Air in the East to be altered with the least Light, they would by the *Situation* of the *Stars* find how many Degrees the *Sun* was below the *Horizon*, which was usually about 18. From whence they would easily Conclude, how high that Air must be above us, which the *Sun* could shine upon, when he was 18 Degrees

18 Degrees below us. And from this Obſervation, it was Concluded to be about 52 Miles high. *Vitel. l.* 10 *Theo.* 7.

But in this Concluſion, the Antients were much deceived, becauſe they proceeded upon a wrong Ground, whilſt they ſuppoſed that the ſhining of the Suns direct Rays upon the Air, was the only reaſon of *Crepuſculum*; Whereas 'tis certain that there are many other things which may alſo concur to the cauſing of it. As, *Keplar. Ep. Coper. l.* 1. *part.* 3.

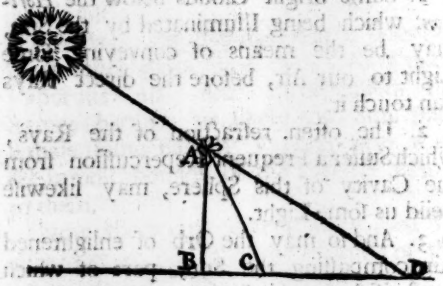
1. Some bright Clouds below the *Horizon*, which being Illuminated by the Sun, may be the means of conveying ſome Light to our Air, before the direct Rays can touch it.

2. The often refraction of the Rays, which Suffer a Frequent Repercuſſion from the Cavity of this Sphere, may likewiſe yeild us ſome Light.

3. And ſo may the Orb of enlightened Air compaſſing the Sun, part of which muſt riſe before his Body.

2. The ſecond way whereby we may more ſurely find the Altitude of this groſſer Air, is by taking the higheſt Cloud: which may be done, 1. Either as they uſe to meaſure the Altitude of things that cannot be approached unto, *viz.* by two Stations, when two Perſons ſhall at the ſame time, in ſeveral places, obſerve the Declination of any Cloud from the Vertical point. Or, which is the more eaſie way, when a Man ſhall chooſe ſuch a Station, where he may *Stevinnius. Geog. l.* 3. *prop.* 3.

at ſome diſtance, diſcern the place on which the Cloud does caſt its ſhadow, and withal does Obſerve, how much both the Cloud and the Sun decline from the Vertical point. From which he may eaſily conclude the true Altitude of it, as you may more plainly conceive, by this following *Diagram*.



Where *A B* is a perpendicular from the Cloud, *C* the Station of him that Meaſures, *D* the place where the ſhadow of the Cloud does fall.

The Inſtrument being directed from the Station *C*, to the Cloud at *A*, the perpendicular will ſhew the Angle *B A C*. Then leting the Sun ſhine through the Sights of your Inſtrument, the perpendicular of it will

will give the Angle *B A D.* Afterwards having measured the distance *C D* by paces, you may according to the common Rules, find the height *B A.* *Pitisc. Trigon.*

But if without making the Observation, you would know of what Altitude the highest of these are found by Observation; * *Cardan* answers, not above Two Miles; * *Kepler*, not above 1600 Paces, or thereabouts. * *Subt. l. 17.*

3. Another way to find the height of this Vaporous Air, is, by knowing the difference of Altitude, which it causeth, in refracting the Beams of any Star near the *Horizon.* And from this Observation also, it is usually concluded to be about Two or Three Miles high. * *Epit. Copper. l. 1. p. 3.*

But now you must not conceive, as if the Orb of Magnetical Vigor, were bounded in an exact Superficies, or, as if it did equally hold out just to such a determinate Line, and no farther. But as it hath been said of the first Region, which is there terminated, where the Heat of Reflection does begin to Languish: So likewise is it probable, that this Magnetical Vigor does Remit of its degrees proportionally to its distance from the Earth, which is the cause of it: And therefore though the thicker Clouds may be Elevated no higher, yet this Orb may be continued in weaker degrees a little beyond them. We will suppose it (which in all likely-hood is the most) to be about Twenty Miles high. So that you see the former Thesis remains probable:

that if a Man could but Fly, or by any other means get Twenty Miles upwards, it were possible for him to reach unto the Moon.

But it may be again Objected: Though all this were true; though there were such an Orb of Air which did terminate the Earths Vigour: And though the heavyness of our Bodies could not hinder our passage, through the vast spaces of the Ætherial Air; yet those two other Impediments may seem to deny the possibility of any such Voyage.

1. The extream *coldness* of that Air. If some of our higher Mountains for this reason be not habitable; much more then will those places be so, which are farther from any cause of Heat.

2. The extream thinness of it, which may make it unfit for Expiration. For if in some Mountains (as *Aristotle* tells us of *Olympus*, and out him * *S. Austin*) the Air be so thin that Men cannot draw their Breath, unless it were through some moistned Spunges; much more then must that Air be thin, which is more remotely Situated from the causes of Impurity and Mixture. And then beside, the Refraction that is made by the Vaporous Air incompassing our Earth, may sufficiently prove that there is a great difference betwixt the Ætherial Air and this, in respect of Rarity.

* *In Gen. ad lit. eram. li. 3. cap. 2.*

To the first of these I answer, that though the

the second Region, be naturally endowed with so much Coldness as may make it fit for the Production of Meteors; yet it will not hence follow, that all that Air above it, which is not appointed for the like purpose, should partake of the same Condition: But, it may seem more probable that this Æthereal Air, is freed from having any quality in the extreams. And this may be confirmed, from those Common Arguments, which are usually brought to prove the warmness of the Third Region. As you may see in * *Fromundus*, and others who Treat of that Subject.

* *Meteor. lib.* 1. *c.* 2. *art.* 1.

'Tis the Assertion of *Pererius*, that the second Region, is not cold meerly for this reason, because it is distant from the Ordinary causes of Heat, but because it was actually made so at the first, for the Condensing of the Clouds, and the Production of other Meteors that were there to be generated; which (as I conceive) might be Sufficiently confirmed from that Order of the Creation Observed by *Moses*, who tell us that the Waters above the Firmament (by which, in the greatest probability, we are to understand the Clouds in the second Region) were made the second day, *Gen.* 1. 7, 8. Whereas the Sun it self (whose Reflection is the cause of Heat) was not Created till the Fourth Day, *ver.* 16. 19.

Comment. in Gen. 1. 8.

To the other Objection, I Answer, that though the Air in the second Region (where by reason of its coldness there are many thick

thick Vapours) do cause a great Refraction; yet 'tis probable that the Air which is next the Earth, is sometimes, and in some places of a far greater thinness, nay, as thin as the Æthereal Air it self; since sometimes there is such a special Heat of the Sun, as may Rarifie it in an Eminent degree; And in some dry places, there are no gross impure Exhalations to mix with it.

But here it may be Objected. If the Air in the second Region were more Condensed and heavy than this wherein we Breath, then that must necessarily tend downwards and possess the lower place.

To this some Answer, That the hanging of the Clouds in the open Air, is no less than a Miracle. They are the Words of *Pliny*, *Quid mirabilius, aquis in cælo stantibus?* what more wonderful thing is there than that the Waters should stand in the Heavens? Others prove this from the Derivation of the word שמים from שנה *stupescere* and מים *aquæ*: Because the Waters do hang there after such a stupendous inconceivable manner; Which seems likewise to be favoured by Scripture, where 'tis mentioned as a great Argument of Gods Omnipotency, that he holds up the Clouds from falling. *He binds up the Waters in his thick Clouds, and the Cloud is not rent under them.*

Hist. l. 31. *cap.* 1.

Job. 26. 8:

But that which unto me seems full Satisfaction against this doubt, is this Con-

Consideration; that the Natural Vigor, whereby the Earth does attract Dense Bodies unto it, is less Efficacious at a distance: and therefore a Body of less Density, which is near unto it, as suppose, this thin Air wherein we breath, may Naturally be lower in its Scituation, than another of a greater Condensity that is farther of; as suppose, the Clouds in the second Region. And though the one be absolutely, and in it self more fit for this Motion of Descent; yet, by reason of its distance, the Earths Magnetical Vertue cannot so Powerfully work upon it.

As for that Relation of *Aristotle*; If it were true; yet it does not prove this Air to be altogether impossible, since moistened Spunges might help us against its thinness: But 'tis more likely, that he took it upon Trust, as he did some other Relations concerning the height of the Mountains, wherein 'tis Evident, that he was grosly mistaken. As where he tells us of *Caucasus*, that it cast its shadow 560 Miles. And this Relation being of the same Nature, we cannot safely trust unto him for the Truth of it. *Meteor. l.1.c.11.*

If it be here enquired, what means there may be Conjectured, for our ascending beyond the Sphere of the Earths Magnetical Vigor.

I Answer, 1. 'Tis not perhaps impossible, that a Man may be able to Fly, by the Application of Wings to his own Body; As Angels are Pictured, as *Mercury* and *Dædalus*

lus are feigned, and as hath been attempted by divers, particulary by a Turk in *Constantinople*, as *Busbequius* Relates.

Mr. Burton. Melanch. pa. 2. sect. 2. mem. 3.

2. If there be such a great *Ruck* in *Madagascar*, as * *Marcus Polus* the Venetian mentions, the Feathers in whose Wings are Twelve Foot Long, which can soop up a Horse and his Rider, or an Elephant, as our Kites do a Mouse; why then 'tis but Teaching one of these to carry a Man, and he may Ride up thither, as *Ganymed* does upon an Eagle.

* *Lib.* 3. *c.* 40.

3. Or if neither of these Ways will serve: Yet I do seriously, and upon good Grounds, affirm it possible to make a Flying Chariot. In which a Man may sit, and give such a Motion unto it, as shall convey him through the Air. And this perhaps might be made large enough to carry divers Men at the same time, together with Food for their *Viaticum*, and Commodities for Traffique. It is not the bigness of any thing in this kind, that can hinder its Motion, if the Motive Faculty be answerable thereunto. We see a great Ship Swims as well as a small Cork, and an Eagle Flies in the Air as well as a little gnat.

This Engine may be contrived from the same Principles by which *Archytas* made a wooden Dove, and *Regiomontanus* a wooden Eagle.

I conceive it were no difficult matter (if a Man had leisure) to shew more particularly, the means of composing it.

The

The perfecting of such an Invention, would be of such excellent use, that it were enough, not only to make a Man Famous, but the Age also wherein he Lives. For besides the strange discoveries that it might occasion in this other World, it would be also of inconceivable advantage for Travelling, above any other Conveiance that is now in use.

So that notwithstanding all these seeming impossibilities, 'tis likely enough, that there may be a means invented of Journying to the Moon; And how happy shall they be, that are first successful in this attempt?

------Fœliceſque animæ, quas nubila ſupra,
Et turpes fumos, plenumque vaporibus orbem,
Inſeruit cælo ſancti ſcintilla Promethei.

Having thus finished this Discourse, I chanced upon a late fancy to this purpose under the fained Name of *Domingo Gonsales*, written by a late Reverend and Learned Bishop: In which (besides Sundry particulars wherein this later Chapter did unwittingly agree with it) there is delivered a pleasant and well contrived Fancy concerning a Voyage to this other World.

He Supposeth that there is a Natural and usual Passage for many Creatures betwixt our Earth and this Planet. Thus he says; those great Multitudes of Locusts wherewith divers Countries have bin Destroyed, do Proceed from thence. And if we Peruse the Authors who Treat of them, we shall find that many times they Fly in Num-

Numberleſs Troops, or Swarms, and for ſundry Days together before they Fall, are ſeen over thoſe places in great high Clouds, ſuch as coming nearer, are of Extenſion enough to Obſcure the Day, and hinder the Light of the Sun. From which, together with divers other ſuch Relations, he Concludes, that 'tis not altogether Improbable, they ſhould proceed from the Moon. Thus likewiſe he Suppoſeth the Swallows, Cuckoes, Nightingales, with divers other Fowl, which are with us only half a Year, to Fly up thither, when they go from us. Amongſt which kind, there is a Wild Swan in the Eaſt-Indies, which at certain Seaſons of the Year do Conſtantly take their Flight thither. Now this Bird being of a great Strength, able to Continue for a long Flight, as alſo going uſually in Flocks, like our Wild Geeſe; he Suppoſeth that many of them together, might be thought to carry the Weight of a Man; eſpecially, if an Engine were ſo Contrived (as he thinks it might) that each of them ſhould Bear an equal ſhare in the Burden. So that by this means, 'tis eaſily Conceiveable, how once every Year a Man might Finiſh ſuch a Voyage; going along with theſe Birds at the beginning of Winter, and again Returning with them at the Spring.

And here, One that had a ſtrong Fancy, were better Able to ſet forth the great Benifit and Pleaſure to be had by ſuch a Journey

Journey. And that whether you Conſider the Strangeneſs of the Perſons, Language, Art, Policy, Religion of thoſe Inhabitants, together with the new Traffick that might be brought thence. In Brief, do but Conſider the Pleaſure and Profit, of thoſe later Diſcoveries in *America*, and we muſt needs Conclude this to be Inconceiveably beyond it.

But ſuch Imaginations as theſe, I ſhall leave to the Fancy of the Reader.

———Sic itur ad aſtra.
Reptet humi quicunque velit———

Cœlo reſtat iter, cœlo tentabimus ire:

FINIS.

A

DISCOURSE

Concerning a

New Planet,

Tending to prove
That 'tis probable our EARTH
is one of the PLANETS.

The Second Book.

By *John Wilkins*, late L. Bishop of *Chester*.

Digna res est Contemplatione, ut sciamus in quo rerum statu scimus: pigerimam sortiti, an velocissimam sedem: circa nos Deus omnia, an nos agat. Sen. *Nat. Quest.* lib. 7. cap. 2.

LONDON:
Printed by *J. D.* for *John Gellibrand*, at the Golden Ball in St. *Paul's* Church-Yard. M.DC.LXXXIV.

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To the Reader.

NOt to trouble you with an *Invective* againſt thoſe multitudes of *Pamphlets* which are every day preſt into the World; or an *Apologie*, why this was publiſhed amongſt the reſt (the uſual Matter for ſuch kind of Epiſtles): Let me in brief preadmoniſh you ſomething concerning the chief Scope and Manner of this following Diſcourſe.

1. 'Tis not the *purpoſe* of it, to ſet down an exact Treatiſe of this kind of *Aſtronomy*; but rather to remove thoſe common Prejudices, which uſually deter Men from taking any *Argument* tending this way, into their conſiderations. For we may obſerve, that in thoſe Points which are cried down by the more

general Opinion, Men do for the moſt part reſt themſelves in the ſuperficial knowledg of things, as they ſeem at their firſt appearances, thinking they can ſay enough to any Paradox, againſt which they can urge the moſt obvious and eaſy Objections; and therefore ſeldom or never ſearch into the depth of theſe Points, or enter into any ſerious impartial examination of thoſe grounds on which they are bottom'd. Which as it muſt needs be a great hindrance to the proficiency of all kind of Learning; ſo more eſpecially is it in this particular. We might diſcern a greater comelineſs and order in this great Fabrick of the World, and more eaſily underſtand the Appearances in Aſtronomy, if we could with indifferency attend to what might be ſaid for that Opinion of *Copernicus*, which is here defended.

2. For

2. *For the Manner.* It is not maintained with such Heat and Religion, as if every one that reads it, were presently bound to yield up his assent: But as it is in other Wars, where *Victory* cannot be had, Men must be content with Peace: So likewise is it in this, and should be in all other Philosophical Contentions. If there be nothing able to convince and satisfy the indifferent Reader, he may still enjoy his own Opinion. All Men have not the same way of apprehending things; but according to the variety of their Temper, Custom, and Abilities, their Understandings are severally fashioned to different Assents: Which had it been but well considered by some of our hot *Adversaries, they would not have shewed more *violence* in opposing the *Persons* against whom they write, than *strength* in confuting the *Cause*.

*Fromond. Al Rosse.

'Tis

'Tis an excellent Rule to be observed in all Disputes, That Men should give *soft Words* and *hard Arguments*; that they would not so much strive to *vex*, as to *convince* an Enemy. If this were but diligently practised in all Cases, and on all sides, we might in a good measure be freed from those Vexations in the search of Truth, which the wise *Solomon*, by his own experience did so much complain of: *Eccles.* 1. 18. *In much Wisdom there is much Grief; and he that increaseth Knowledg, increaseth Sorrow.*

To conclude: Tho there should be nothing in this Discourse conducible to your Information and Benefit; yet it may serve in the *Perusal*, as it did in the *Composure*, for the recreation of such leisure hours, as may conveniently be spared from more weighty Employments. *Farewel.*

The

The PROPOSITIONS that are insisted on in this Discourse.

PROP. I.

THat the seeming Novelty and Singularity of this Opinion, can be no sufficient Reason to prove it Erroneous.

PROP. II.

That the places of Scripture, which seem to intimate the Diurnal Motion of the Sun, or Heavens, are fairly capable of another interpretation.

PROP. III.

That the Holy Ghost, in many places of Scripture, does plainly conform his Expressions to the Error of our Conceits, and does not speak of sundry things as they are in themselves, but as they appear unto us.

PROP. IV.

That divers learned Men have fallen into great Absurdities, whilst they have looked for the Grounds of Philosophy from the Words of Scripture.

PROP. V.

That the words of Scripture, in their proper and

and ſtrict conſtruction, do not any where affirm the Immobility of the Earth.

PROP. VI.

That there is not any Argument from the words of Scripture, Principles of Nature, or Obſervations in Aſtronomy, which can ſufficiently evidence the Earth to be in the Centre of the Univerſe.

PROP. VII.

'Tis probable that the Sun is in the Centre of the World.

PROP. VIII.

That there is not any ſufficient reaſon to prove the Earth incapable of thoſe Motions which Copernicus *aſcribes unto it.*

PROP. IX.

That it is more probable the Earth does move, than the Heavens.

PROP. X.

That this Hypotheſis *is exactly agreeable to common Appearances.*

That

That the EARTH May be a PLANET.

PROP. I.

That the ſeeming Novelty and Singularity of this Opinion, can be no ſufficient Reaſon to prove it Erroneous.

IN the ſearch of Theological Truths, it is the ſafeſt method, firſt of all to look unto Divine Authority; becauſe that carries with it as clear an evidence to our Faith, as any thing elſe can be to our Reaſon. But on the contrary, in the examination of Philoſophical points, it were a preposterous courſe to begin at the Teſtimony

and Opinion of others, and then afterwards to deſcend unto the Reaſons that may be drawn from the Nature and Eſſence of the things themſelves: Becauſe theſe inartificial Arguments (as the *Logicians* call them) do not carry with them any clear and convincing evidence; and therefore ſhould come after thoſe that are of more neceſſary dependance, as ſerving rather to confirm, than reſolve the Judgment.

But yet, ſo it is, that in thoſe points which are beſides the common Opinion, men are carried away at the firſt by the general cry, and ſeldom or never come ſo far as to examin the reaſons that may be urged for them. And therefore, ſince it is the purpoſe of this diſcourſe to remove thoſe prejudices which may hinder our Judgment in the like caſe, 'tis requiſit that in the firſt place there be ſome ſatisfaction given to thoſe Arguments that may be taken from the Authority of others.

Which Arguments are inſiſted on by our adverſaries with much heat and violence.

What (ſay they) ſhall an upſtart Novelty thruſt out ſuch a Truth as hath paſſed by ſucceſſive tradition through all Ages of the World? And hath been generally entertained, not only in the Opinion of the vulgar, but alſo of the greateſt Philoſophers and moſt Learned Men? * Shall we think that amongſt the multitude of thoſe who in ſeveral times have been eminent for new inventions and ſtrange diſcoveries, there was none able

* *Alex. Roſſ. de Terræ motu, contra Lansb. lib. 1 ſect. 1. cap 10.*

able to find out ſuch a Secret as this, beſides ſome fabulous *Pythagorians*, and of late *Copernicus*? Is it poſſible that the World ſhould laſt for above five thouſand years together, and yet the Inhabitants of it be ſo dull and ſtupid, as to be unacquainted with its motion? Nay, ſhall we think that thoſe excellent Men, whom the Holy Ghoſt made uſe of in the penning of Scripture, who were extraordinarily inſpired with ſupernatural Truths, ſhould notwithſtanding be ſo groſly ignorant of ſo common a matter as this? Can we believe, if there were any ſuch thing, that *Joſuah*, and *Job*, and *David*, and *Solomon*, &c. ſhould know nothing of it? Certainly it muſt needs argue a ſtrong affectation of Singularity, for a Man to take up any groundleſs fancy againſt ſuch antient and general Authority.

I anſwer: As we ſhould not be ſo fondly conceited of our ſelves, and the extraordinary Abilities of theſe preſent Ages, as to think every thing that is antient to be abſolute: Or, as if it muſt needs be with Opinions, as it is with Clothes, where the neweſt is for the moſt part beſt. So neither ſhould we be ſo ſuperſtitiouſly devoted to Antiquity, as to take up every thing for Canonical, which drops from the pen of a Father, or was approved by the conſent of the Antients. 'Tis an excellent ſaying, * Δεῖ ἐλευθέριον εἶναι τῇ γνώμῃ τὴν μέλλοντα φιλοσοφεῖν. It behoves every one in the ſearch of Truth, always to preſerve a Philoſophical liberty: Not to be ſo inſlaved

* *Alcinous*

to the Opinion of any Man, as to think what ever he ſays to be infallible. We muſt labour to find out what things are in themſelves by our own experience, and a through examination of their natures, not what another ſays of them. And if in ſuch an impartial enquiry, we chance to light upon a new way, and that which is beſides the common rode, this is neither out fault, nor our unhappineſs.

Not our fault, becauſe it did not ariſe from Singularity or Affectation. Not our unhappineſs, becauſe it is rather a Priviledge to be the firſt in finding out ſuch Truths, as are not diſcernable to every common eye. If Novelty ſhould always be rejected, neither would Arts have arrived to that perfection wherein now we enjoy them; nor could we ever hope for any future reformation: Though all Truth be in it ſelf Eternal; yet in reſpect of Mens Opinions, there is ſcarce any ſo antient, but had a beginning, and was once accounted a Novelty; and if for this reaſon it had been condemned as an errour, what a general darkneſs and ignorance would then have been in the World, in compariſon of that light which now abounds; according to that of the Poet:

* *Horat. lib. 2. ep. 1.*

* *Quod ſi tam Antiquis Novitas invisa fuiſſet,*
Quam nobis, quid nunc eſſet vetus aut quid haberet,
Quod legerent tereretq; viritim publicus uſus?

If our Forefathers had but hated thus,
All that were new, what had been old to us?

Or,

Or, how might any thing confirmed be,
For publick use, by its Antiquity?

But for more full satisfaction of all those scruples that may arise from the seeming Novelty or Singularity of this Opinion, I shall propose these following considerations.

Suppose it were a Novelty: Yet 'tis in Philosophy, and that is made up of nothing else; but receives addition from every days experiment. True indeed, for Divinity we have an infallible rule that do's plainly inform us of all necessary Truths; and therefore the Primitive Times are of greater Authority, because they were nearer to those holy Men who were the Pen-Men of Scripture. But now for Philosophy, there is no such reason: What ever the School-Men may talk; yet *Aristotles* works are not necessarily true, and he himself hath by sufficient Arguments proved himself to be liable unto errour. Now in this case, if we should speak properly, Antiquity do's consist in the old age of the World, not in the youth of it. In such Learning as may be increased by fresh experiments and new discoveries: 'Tis we are the Fathers, and of more Authority than former Ages; because we have the advantage of more time than they had, and Truth (we say) is the Daughter of Time. However, there is nothing in this Opinion so Magisterially proposed, but the Reader may use his own liberty; and if all the reasons considered together, *Consid.* 1.

do not ſeem convincing unto him, he may freely reject it.

In thoſe natural points which carry with them any doubt or obſcurity, it is the ſafeſt way to ſuſpend our aſſents: And though we may diſpute *pro* or *con*; yet not to ſettle our Opinion on either ſide.

Corollar. 2. In weighing the Authority of others 'tis not their multitude that ſhould prevail, or their skill in ſome things that ſhould make them of credit in every thing, but we ſhould examine what particular inſight and experience they had in thoſe times for which they are cited. Now 'tis plain, that Common People judge by their ſences; and therefore, their voices are altogether unfit to decide any Philoſophical doubt, which cannot well be examined or explained without Diſcourſe and Reaſon. And as for the antient Fathers, though they were Men very eminent for their holy lives and extraordinary skill in Divinity; yet they were moſt of them very Ignorant in that part of Learning which concerns this Opinion, as appears by many of their groſs miſtakes in this kind, as that concerning the *Antipodes*, &c. and therefore it is not their Opinion neither, in this buſineſs, that to an indifferent ſeeker of Truth will be of any ſtrong Authority.

* *Alex. Roſſ. l.* 1. *c.* 8. But againſt this it is * objected, that the inſtance of the *Antipodes* do's not argue any ſpecial Ignorance in theſe Learned Men: Or, that they had leſs skill in ſuch human Arts than

than others; since *Aristotle* himself, and *Pliny*, did deny this as well as they.

I answer:

1. If they did, yet this do's make more to the present purpose: For if such great Schollars, who were so eminent for their knowledge in natural things, might yet notwithstanding be grosly mistaken in such matters as are now evident and certain: Why then we have no reason to depend upon their assertions or Authorities, as if they were infallible.

2. Though these great Naturalists, for want of some experience were mistaken in that Opinion, whilest they thought no place was habitable but the temperate *Zones*; yet it cannot be from hence inferred, that they denied the possibility of *Antipodes:* Since these are such Inhabitants as live opposite unto us in the other temperate *Zone*; and 'twere an absurd thing to imagin that those who lived in different *Zones*, can be *Antipodes* to one another; and argues that a Man did not understand, or else had forgotten that common distinction in *Geography*, wherein the relation of the Worlds Inhabitants unto one another, are reckoned up under these three heads; *Antæci*, *Periæci*, and *Antipodes*. But to let this pass: 'Tis certain, that some of the Fathers did deny the being of any such, upon other more absurd grounds. Now if such as *Chrysostom*, *Lactantius*, &c. who were noted for great Schollars, and such too as flourished in these latter times, when all human Learning was

more generally profeſt, ſhould notwithſtanding be ſo much miſtaken in ſo obvious a matter: Why then may we not think that thoſe Primitive Saints, who were the Pen-Men of Scripture, and eminent above others in their time for Holineſs and Knowledge, might yet be utterly Ignorant of many Philoſophical Truths, which are commonly known in theſe days? 'Tis probable, that the Holy Ghoſt did inform them only with the knowledge of thoſe things whereof they were to be the Pen-Men, and that they were not better skilled in points of Philoſophy than others. There were indeed ſome of them who were ſupernaturally indowed with human Learning; yet this was, becauſe they might thereby be fitted for ſome particular ends, which all the reſt were not appointed unto: Thus *Solomon* was ſtrangely gifted with all kind of knowledge, in a great meaſure, becauſe he was to teach us by his own experience the
Eccl. 1. 18. extreme Vanity of it, that we might not ſo ſettle our deſires upon it, as if it were able to yield us contentment. So too the Apoſtles were extraordinarily inſpired with the knowledge of Languages, becauſe they were to preach unto all Nations. But it will not hence follow, that therefore the other Holy Pen-Men were greater Schollars than others. 'Tis likely that *Job* had as much human Learning as moſt of them, becauſe his Book is more eſpecially remarkable for lofty expreſſions, and diſcourſes of Nature; and yet 'tis not likely that he was acquainted with

with all those mysteries which later Ages have discovered; because when God would convince him of his own Folly and Ignorance, he proposes to him such questions, as to him were altogether unanswerable; which notwithstanding, any ordinary Philosopher in these days might have resolved: As you may see at large in the thirty eighth Chapter of that Book.

The occasion was this: *Job* having * before desired that he might dispute with the Almighty concerning the uprightness of his own ways, and the unreasonableness of those afflictions which he underwent, do's at length obtain his desire in this kind; and God vouchsafes in this thirty eighth Chapter, to argue the case with him. Where he do's shew *Job* how unfit he was to judge of the ways of Providence, in disposing of Blessings and Afflictions, when as he was so Ignorant in ordinary matters, being not able to discern the reason of natural and common events. As † why the Sea should be so bounded from overflowing the Land? What is the * bredth of the Earth? What is the † reason of the Snow or Hail? What was the * cause of the Rain or Dew, of Ice and Frost, and the like. By which questions, it seems *Job* was so utterly puzled, that he is fain afterwards to humble himself in this acknowledgment: * *I have uttered that I understood not, things too wonderful for me, which I knew not: Wherefore I abhor my self, and repent in dust and ashes.*

* *Cap.* 13. 3.

† *V.* 8. 10, 11.

* *Ver.* 18.

† *Ver.* 22.

* *V.* 28. 29.

* *C.* 42. 3

So

So that 'tis likely these Holy Men had not these human Arts by any special inspiration, but by instruction and study, and other ordinary means; and therefore *Moses* his skill in this kind is called the Learning of the *Egyptians*. Now because in those times all Sciences were taught only in a rude and imperfect manner; therefore 'tis likely that they also had but a dark and confuse apprehension of things, and were liable to the common errours. And for this reason is it, why * *Tostatus* (speaking of *Joshuas* bidding the Moon stand still as well as the Sun) says *Quod forte erat imperitus circa Astrorum doctrinam, sentiens ut vulgares sentiunt*: That perhaps he was unskilful in Astronomy, having the same gross conceit of the Heavens, as the vulgar had. From all which it may be inferred, that the Ignorance of such good Men and great Schollars concerning these Philosophical points, can be no sufficient reason, why after examination we should deny them, or doubt of their Truth.

Acts 7.22.

* *Josh ca.* 10. *Quest.* 19.

Consid. 3.

'Tis considerable, that in the rudiments and first beginnings of *Astronomy*, and so in several Ages after, this Opinion hath found many Patrons, and those too Men of eminent note and Learning. Such was more especially *Pythagoras*, who was generally and highly esteemed for his divine wit, and rare inventions; under whose mysterious sayings, there be many excellent Truths to be discovered.

But against his Testimony, it is again

† objected;

† objected; If *Pythagoras* were of this Opinion, yet his Authority should not be of any credit, because he was the Author of many other monstrous absurdities.

† *Alex. Ross. l.2. se. 2. c. 10.*

To this I answer: If a Mans errour in some particulars should take away his credit for every thing else, this would abolish the force of all human Authority; for *humanum est errare.* Secondly, 'tis probable that many of *Pythagoras*'s sayings which seem so absurd, are not to be understood according to their letter, but in a mystical sense.

2. But he objects again, that *Pythagoras* was not of this Opinion; and that for two reasons: First, because no Antient Author that he had read ascribes it unto him. Secondly, it is contradictory to his other Opinions, concerning the Harmony that was made by the motion of the Heavens; which could not consist with this other of the Earth's motion.

To the First I answer: The Objector could not chuse but know that this assertion is by many Antient Authors ascribed to that sect, whereof *Pythagoras* was the chief. He might have seen it expresly in * *Aristotle* himself: Οἱ δὲ Πυθαγόρειοι λέγουσιν ἐπὶ μὲν τοῦ μέσου πῦρ εἶναι, τὴν τε γῆν ἐν τῶν ἄστρων οὖσαν κύκλῳ φερομένην περὶ τὸ μέσον, νύκτα τε καὶ ἡμέραν ποιεῖν.

* *De Cœlo. lib. 2. c. 13.*

In which the Philosopher do's compendiously reckon up the three chief particulars implyed in the Opinion of the *Pythagorians.* First, the Suns being in the Centre of the

the World. Secondly, the Earth's annual motion about it, as being one of the planets: Thirdly, its diurnal revolution, whereby it caused day and night.

To his second reason I answer: First, that *Pythagoras* thought the Earth to be one of the Planets (as appears by *Aristotles* Testimony concerning him) and to move amongst the rest. So that his Opinion concerning the motion of the Heavens, is not inconsistent with that of the Earth. Secondly, but as for the Cœlestial Harmony, he might perhaps under this mystical expression, according to his usual Custom, shadow forth unto us that mutual proportion and Harmonical consent, which he did conceive in the several bigness, distance, motions of the Orbs. So that notwithstanding these objections, it is evident that *Pythagoras* was of this Opinion, and that his Authority may add somewhat for the confirmation of it. Unto him assented * *Aristarchus Samius*, who flourished about 280 years before the Birth of our Saviour, and was by reason of this Opinion, arraigned for Prophaness and Sacriledge by the *Areopagites*, because he had blasphemed the Deity of *Vesta*, affirming the Earth to move. To them agreed *Philolaus*, *Heraclides*, *Pontius*, *Nicetas*, *Syracusanus*, *Ecphantus*, *Lucippus*, and *Plato* himself (as some think.) So likewise *Numa Pompilius*, as *Plutarch* relates it in his Life; who in reference to this Opinion, built the Temple of *Vesta* round, like the Universe: In the middle of it was placed the perpetual

* *Archimedes de arenæ numero.*

perpetual vestal Fire; by which he did represent the Sun in the Centre of the World. All these Men were in their several times of special Note, as well for their extraordinary Learning as for this Opinion.

4. Consid. 'Tis considerable, that since this Science of *Astronomy* hath been raised to any perfection, there have been many of the best skill in it, that have assented unto that assertion which is here defended. Amongst whom was the Cardinal *Cusanus*, but more especially *Copernicus*, who was a Man very exact and diligent in these studies for above 50 years together, from the year 1500. to 1530. and upwards: And since him, most of the best Astronomers have been of his side. So that now, there is scarce any of note and skill, who are not *Copernicus* his followers, and if we should go to most voices, this Opinion would carry it from any other. It would be too tedious to reckon up the names of those that may be cited for it; I will only mention some of the chief: Such were *Joachimus Rheticus*, an elegant Writer, *Christopherus Rothman*, *Mestlin*, a Man very eminent for his singular skill in this Science; who though at the first he were a follower of *Ptolomy*, yet upon his second and more exact thoughts, he concluded *Copernicus* to be in the right, and that the usual *Hypothesis*, * *præscriptione potius quàm ratione valet*, do's prevail more by prescription then reason. So likewise *Erasmus Reinholdus*, who was the Man that calculated the Prutenical Tables from *Copernicus*

De doctâ ignor. lib. 2. cap. 12.

* *Pref. ad Narrat. Rhetici.*

Ibid. nicus his obſervations, and did intend to write a Commentary upon his other Works, but that he was taken out of this Life before he could finiſh thoſe reſolutions. Unto theſe alſo I might add the names of *Gilbert*, *Keplar*, *Galilæus*, with ſundry others, who have much beautified and confirmed this *Hypotheſis*, with their new inventions. Nay I may ſafely affirm, that amongſt the variety of thoſe Opinions that are in *Aſtronomy*, there are more (of thoſe which have skill in it) that are of this Opinion, not only than any other, but than all the reſt put together. So that now it is a greater Argument of Singularity to oppoſe it.

5. *Conſid.* 'Tis probable, that many other of the Antients would have aſſented unto this Opinion, if they had been acquainted with thoſe experiments which later times have found out for the confirmation of it: And therefore * *Rheticus* and † *Keplar* do ſo often wiſh that *Ariſtotle* were now alive again. Queſtionleſs he was ſo rational and ingenious a Man (not half ſo obſtinate as many of his followers) that upon ſuch probabilities as theſe, he would quickly have renounced his own Principles, and have come over to this ſide: For in one place, having propoſed ſome queſtions about the Heavens, which were not eaſie to be reſolved: He ſets down this rule, that in difficulties, a Man may take a liberty to ſpeak that which ſeems moſt likely to him: And in ſuch caſes, an aptneſs to gueſs at ſome reſolution, for the ſatisfying

* *In Narratione.*

† *Myſt. Cosmogr. cap. 1. Item pref. ad 4. l. Aſtr. Copern.*

de Cæl. l. 2. c. 12.

of

of our Philoſophical thirſt, do's deſerve rather to be ſtiled by the name of Modeſty, than Boldneſs. And in another place, he referrs the Reader to the different Opinions of Aſtronomers, adviſing him to examin their ſeveral tenents, as well *Eudoxus* as *Calippus*; and to entertain that (not which is moſt antient, but) which is moſt exact and agreeable to reaſon. And as for *Ptolomy*, 'tis his counſel, that we ſhould endeavour to frame ſuch ſuppoſitions of the Heavens, as might be more ſimple, being void of all ſuperfluities: And he confeſſes, that his *Hypotheſis* had many implications in it, together with ſundry intricate and unlikely turnings; and therefore in the ſame place, he ſeems to admoniſh us, that we ſhould not be too confident the Heavens were really in the ſame Form, wherein Aſtronomers did ſuppoſe them. So that 'tis likely, 'twas his chief intent to propoſe unto us ſuch a frame of the Cœleſtial Bodies, from which we might, in ſome meaſure, conceive of their different appearances; and according to which, we might be able to calculate their motions. But now, 'tis *Copernicus* his endeavour, to propound unto us, the true natural Cauſes of theſe ſeveral Motions, and Appearances: It was the intent of the one, to ſettle the Imagination; and of the other, to ſatisfie the judgment. So, that we have no reaſon to doubt of his aſſent unto this Opinion, if he had but clearly underſtood all the grounds of it.

Met. lib. 12. *cap.* 8.

Alm. lib. 13. *cap.* 2.

'Tis

'Tis reported of *Clavius*, that when lying upon his Death-bed, he heard the first News of those Discoveries which were made by *Galilæus* his Glass, he brake forth into these words: *Videre Astronomos, quo pacto constituendi sunt orbes Cælestes, ut hæc Phænomena salvari possint:* That it did behove Astronomers, to consider of some other *Hypothesis*, beside that of *Ptolomy*, whereby they might salve all those new appearances. Intimating that this old one, which formerly he had defended, would not now serve the turn: And doubtless, if it had been informed how congruous all these might have been unto the Opinion of *Copernicus*, he would quickly have turned on that side. 'Tis considerable, that amongst the followers of *Copernicus*, there are scarce any, who were not formerly against him; and such, as at first, had been throughly seasoned with the Principles of *Aristotle*; in which, for the most part, they have no less skill, than those who are so violent in the defence of them. Whereas on the contrary, there are very few to be found amongst the followers of *Aristotle* and *Ptolomy*, that have read any thing in *Copernicus*, or do fully understand the Grounds of his Opinion; and I think, not any, who having been once setled with any strong assent on this side, that have afterwards revolted from it. Now if we do but seriously weigh with our selves, that so many ingenious, considering Men, should reject that Opinion which they were nursed up in, and which is generally approved as the truth;

truth; and that, for the embracing of such a *Paradox* as is condemned in Schools, and commonly cried down, as being absurd and ridiculous: I say, If a Man do but well consider all this, he must needs conclude, that there is some strong evidence for it to be found out by examination; and that in all probability, this is the righter side.

'Tis probable, that most of those Authors who have opposed this Opinion, since it hath been confirmed by new Discoveries, were stirred up thereunto by some of these three insufficient Grounds. 7. *Consid.*

1. An over-fond and partial conceit of their proper Inventions. Every Man is naturally more affected to his own Brood, than to that of which another is the Author; though perhaps it may be more agreeable to reason. 'Tis very difficult for any one, in the search of Truth, to find in himself such an indifferency, as that his Judgment is not at all sway'd, by an overweening affection unto that which is proper unto himself. And this perhaps might be the first reason that moved the noble *Tycho*, with so much heat, to oppose *Copernicus*, that so he might the better make way for the spreading of that *Hypothesis*, which was of his own invention. To this I might likewise refer that Opinion of *Origanus*, and Mr. *Carpenter*, who attribute to the Earth, only a diurnal Revolution. It does more especially concern those Men that are *Leaders* of several sides, to beat down any that should oppose them.

2. A ſervile and ſuperſtitious fear of derogating from the Authority of the Ancients, or oppoſing that meaning of Scripture phraſes, wherein the ſuppoſed infallible Church, hath for a long time underſtood them. 'Tis made part of the new Creed, ſet forth by *Pius* the Fourth, 1564. That no Man ſhould aſſent unto any Interpretation of Scripture, which is not approved of by the Authority of the Fathers. And this is the reaſon why the Jeſuits, who are otherwiſe the greateſt affectors of thoſe Opinions, which ſeem to be new and ſubtil, do yet forbear to ſay any thing in defence of this; but rather take all occaſions to inveigh againſt it. * One of them does expreſly condemn it for a Hereſy. And ſince him, it hath been called in by † two Seſſions of the Cardinals, as being an Opinion both abſurd and dangerous. And therefore likewiſe do they puniſh it, by caſting the Defenders of it into the Pope's trueſt Purgatory, the Inquiſition: But yet neither theſe Councels, nor any (that I know of) ſince them, have proceeded to ſuch a peremptory cenſure of it, as to conclude it a Hereſy: fearing perhaps, leſt a more exact examination, and the diſcovery of future times, finding it to be an undeniable Truth, it might redound to the prejudice of their Church, and its Infallibility. And therefore he that is moſt bitter againſt it, in the heat and violence of Oppoſition, will not call it a Hereſy: the worſt that he dares ſay of it, is, That

* *Serrarius Commen. in Joſ. c.* 10. *Queſt.* 14. So *Lipſius Phiſiol. l.* 2

† *An. Dom* 1616. *item* 1633.

That it is, *Opinio temeraria, quæ altero saltem pede intravit Hæresios limen*; A rash Opinion, and bordering upon Heresy. Though unto this likewise he was incited, by the eagerness of Disputation, and a desire of Victory; for it seems many eminent Men of that Church before him, were a great deal more mild and moderate in their censures of it. *Tromondus Antarist. cap. 6.*

Paul the Third, was not so much offended at *Copernicus*, when he dedicated his Work unto him.

The Cardinal of *Cusa*, does expresly maintain this Opinion.

Schombergius, the Cardinal of *Capua*, did, with much importunity, and great approbation, beg of *Copernicus* the Commentaries that he writ in this kind. And it seems the Fathers of the Council of *Trent*, were not such confident Defenders of *Ptolemy*'s *Hypothesis* against *Copernicus*, as many now are. For speaking of those intricate Subtilties, which the Fancies of Men had framed, to maintain the practice of the Church, they compared them to Astronomers, who (say they) do fain *Excentricks* and *Epicycles*, and such Engines of the Orbs, to save the *Phænomena*; though they know there are no such things. But now, because this Opinion of *Copernicus*, in later times, hath been so strictly forbidden, and punished, it will concern those of that Religion, to take heed of medling in the defence of it, but rather to submit the liberty of their Reason, unto the

Command of their Superiors, and (which is very abſurd) even in natural Queſtions, not to aſſent unto any thing, but what Authority ſhall allow of.

3. A judging of things by Sence, rather than by Diſcourſe and Reaſon: a tying of the meaning of Scripture, to the Letter of it; and from thence concluding Philoſophical Points, together with an ignorance of all thoſe grounds and probabilities in Aſtronomy, upon which this Opinion is bottomed. And this, in all likelihood, is the reaſon why ſome Men, who in other things perhaps are able Scholars, do write ſo vehemently againſt it: and why the common People in general do cry it down, as being abſurd and ridiculous. Under this head I might refer the oppoſition of Mr. *Fuller*, *Al. Roſſ.* &c.

But now, no prejudice that may ariſe from the bare Authority of ſuch Enemies as theſe, will be liable to ſway the judgment of an indifferent conſidering Man; and I doubt not but that he who will throughly weigh with himſelf theſe Particulars that are here propounded, may find ſome ſatisfaction for theſe Arguments, which are taken from the ſeeming Novelty and Singularity of this Opinion.

PROP.

PROP. II.

That there is not any place in Holy Scripture, from which (being rightly understood) we may infer the Diurnal Motion of the Sun or Heavens.

IT were happy for us, if we could exempt Scripture from Philoſophical Controverſies: if we could be content to let it be perfect for that end unto which it was intended, for a Rule of our Faith and Obedience; and not ſtretch it alſo to be a Judg of ſuch natural Truths, as are to be found out by our own induſtry and experience. Though the Holy Ghoſt could eaſily have given us a full reſolution of all ſuch particulars; *yet he hath left this travel to the Sons of Men to be exerciſed therewith*; *Mundum reliquit diſputationibus Hominum*; that being buſied, for the moſt part, in an inquiſition after the Creatures, we might find the leſs leiſure to wait upon our Luſts, or ſerve our more ſinful Inclinations. Eccleſ. 3, 10, 11.

But however, becauſe our Adverſaries generally do ſo much inſult in thoſe Arguments that may be drawn from hence; and more eſpecially, becauſe *Pineda* doth for this reaſon, with ſo many bitter and empty reproaches, revile our learned Countryman, *Comment. in Eccleſ. c. 1. v. 4.*

Dr. *Gilbert*, in that renewing of this Opinion, he omitted an answer to the Scripture-Expressions: therefore 'tis requisite, That in the prosecuting this Discourse, we should lay down such satisfaction, as may clear all Doubts that may be taken thence: especially since the prejudice that may arise from the misapprehension of those Scripture-Phrases, may much disable the Reader from looking on any other Argument, with an equal and indifferent mind.

The places that seem to oppose this, are of two kinds. First, Such as imply a Motion in the Heavens: Or, secondly, such as seem to express a Rest and Immobility in the Earth.

Those of the first kind seem to bear in them the clearest evidence, and therefore are more insisted on by our Adversaries. They may be referred unto these three Heads.

1. All those Scriptures where there is any mention made of the Rising or Setting of the Son or Stars.

2. That story in *Joshua*, where the Sun standing still, is reckoned for a Miracle.

3. That other Wonder in the days of *Hezekiah*, when the Sun went back ten degrees in the Dial of *Ahaz*. All which places do seem to conclude, That the Diurnal Motion is caused by the Heavens.

To this I answer in general;

That the Holy Ghost, in these Scripture-expressions, is pleased to accommodate himself

ſelf unto the conceit of the Vulgar, and the uſual Opinion: whereas, if in the more proper phraſe it had been ſaid, That the Earth did riſe and ſet; or, that the Earth ſtood ſtill, *&c.* the People who had been unacquainted with that ſecret in Philoſophy, would not have underſtood the meaning of it, and therefore it was convenient, that they ſhould be ſpoken unto in their own Language.

Ay, but you will reply, It ſhould ſeem more likely, if there had been any ſuch thing, that the Holy Ghoſt ſhould uſe the trueſt expreſſions: for then he would at the ſame time have informed them of the thing, and reformed them in an error: ſince his Authority alone had been ſufficient to have rectified the Miſtake.

I anſwer: 1. Though it were, yet 'tis beſide the chief ſcope of thoſe places, to inſtruct us in any Philoſophical Points, as hath been proved in the former Book; eſpecially when theſe things are neither neceſſary in themſelves, nor do neceſſarily induce to a more full underſtanding of that which is the main buſineſs of thoſe Scriptures. But now the People might better conceive the meaning of the Holy Ghoſt, when he does conform himſelf unto their Capacities and Opinions, than when he talks exactly of things in ſuch a proper phraſe, as is beyond their reach: And therefore 'tis ſaid in *Iſaiah*, *I am the Lord, which teacheth thee* utilia, *profitable things*: where the gloſs has it, *non ſubtilia*,

tilia, not such curiosities of Nature as are not easily apprehended.

2. 'Tis not only besides that which is the chief purpose of those places, but it might happen also to be somewhat opposite unto it. For Men being naturally unapt to believe any thing that seems contrary to their senses, might upon this begin to question the Authority of that Book which affirmed it, or at least to wrest Scripture some wrong way, to force it to some other sence which might be more agreeable to their own false Imagination. * *Tertullian* tells us of some Hereticks, who when they were plainly confuted out of any Scripture, would presently accuse those Texts or Books to be Fallible, and of no Authority; and rather yield Scripture to be erroneous, than forgo those Tenents for which they thought there was so good reason. So likewise might it have been in these Points, which seem to bear in them so much contradiction to the senses and common opinion: and therefore 'tis excellent advice set down by * S. *Austin*; *Quod nihil credere de re obscurâ temere debemus, ne forte quod postea veritas patefecerit, quamvis libris sanctis, sive Testamenti veteris, sive novi, nullo modo esse possit adversum, tamen propter amorem nostri erroris oderimus*: That we should not hastily settle our Opinions concerning any obscure matter, lest afterwards, the Truth being discovered, (which however it may seem, cannot be repugnant to any thing in Scripture) we should

*Præscript cap. 17.

*In Genes. addit. l. 2. in fine.

ſhould hate that, out of love to the Error that we have before entertained. A little reading may inform us how theſe Texts have been abuſed to ſtrange and unmeant Allegories, which have mentioned any natural Truth in ſuch a manner as was not agreeable to Mens Conceits. And beſides, if the Holy Ghoſt had propounded unto us any Secrets in Philoſophy, we ſhould have been apt to be ſo buſied about them, as to neglect other Matters of greater importance. And therefore Saint *Auſtin* propoſing the Queſtion, What ſhould be the reaſon why the Scripture does not clearly ſet down any thing concerning the Nature, Figure, Magnitude, and Motion of the Heavenly Orbs? he anſwers it thus: The Holy Ghoſt being to deliver more neceſſary Truths, would not inſert theſe, leſt Men, according to the pravity of their Diſpoſitions, ſhould neglect the more weighty Matters, and beſtow their thoughts about the ſpeculative natural Points, which were leſs needful. So that it might ſeem more convenient, that the Scripture ſhould not meddle with the revealing of theſe unlikely Secrets, eſpecially when it is to deliver unto us many other Myſteries of greater neceſſity, which ſeem to be directly oppoſite to our ſenſe and reaſon. And therefore, I ſay, the Holy Ghoſt might purpoſely omit the treating of theſe Philoſophical Secrets, till time and future diſcovery, might with leiſure ſettle them in the opinion of others: As he is pleaſed, in other things *Ibid. cap. 9*

things of a higher kind, to apply himself unto the Infirmity of our Apprehensions, by being represented, as if he were a humane Nature, with the parts and passions of a Man. So in these things likewise, that he might descend to our Capacities, does he vouchsafe to conform his Expressions, unto the error and mistake of our Judgments.

But before we come to a further illustration, let us a little examine those particular Scriptures, which are commonly urged to prove the motion of the Sun or Heavens. These (as was said) might be distributed under these three Heads.

1. Those places which mention the Rising or Setting of the Sun, as that in the Psalm, *The Sun, like a Bridegroom, cometh out of his Chamber, and rejoiceth as a Gyant to run his Race: His going forth is from the end of Heaven, and his Circuit unto the end of it, and there is nothing hid from the heat thereof.* And that in *Ecclesiastes*, *The Sun ariseth, and the Sun goeth down*, &c.

* Psal. 19. 5, 6.

Eccles. 1. 5.

In which Scriptures, we may observe divers Phrases that are evidently spoken, in reference to the appearance of things, and the false opinion of the Vulgar. And therefore 'tis not altogether unlikely, That this which they seem to affirm concerning the Motion of the Heavens, should also be understood in the same sense.

The Sun like a Bridegroom cometh out of his Chamber; alluding perhaps unto the conceit of

of ignorant People, as if it took rest all the while it was absent from us, and came out of its Chamber, when it arose.

And rejoiceth as a Gyant to run his Race; because in the morning it appears bigger than at other times; and therefore in reference to this appearance, may then be compared unto a *Giant*.

His going forth is from the end of Heaven, and his Circuit unto the ends of it. Alluding again unto the opinion of the Vulgar; who not apprehending the roundness of the Heavens, do conceive it to have two ends; one where the Sun riseth, the other where it setteth.

And there is nothing hid from the heat thereof: speaking still in reference to the common mistake, as if the Sun were actually hot in it self; and as if the heat of the Weather were not generated by reflection, but did immediatly proceed from the body of the Sun.

So likewise, for that in *Ecclesiastes*, where 'tis said, *The Sun riseth, and the Sun goeth down*, &c. Which phrases being properly understood, do import, that he is sometimes in a higher place than at others: whereas, in a circumference, there is no place higher or lower, each part being at the same distance from the Centre, which is the bottom. But now understand the phrase in reference to the Sun's appearance, and then we grant that he does seem sometimes to rise, and sometimes to go down, because

in

in reference to the Horizon, (which common People apprehend to be the bottom, and in the utmoſt bounds of it to join with the Heavens) the Sun does appear in the Morning to riſe up from it, and in the Evening to go down unto it. Now, I ſay, becauſe the Holy Ghoſt, in the manner of theſe expreſſions, does ſo plainly allude unto vulgar Errors, and the falſe appearance of things: therefore 'tis not without probability, that he ſhould be interpreted in the ſame ſenſe, when he ſeems to imply a motion in the Sun or Heavens.

2. The ſecond place, was that relation in *Joſhua*; where 'tis mentioned as a Miracle, That the Sun did ſtand ſtill. And *Joſhua* ſaid, *Sun, ſtand thou ſtill upon* Gibeon, *and thou Moon in the Valley of* Ajalon. *So the Sun ſtood ſtill in the midſt of Heaven, and haſted not to go down about a whole day. And there was no day like that, before it, or after it.* In which place likewiſe, there are divers phraſes wherein the Holy Ghoſt does not expreſs things according to their true nature, and as they are in themſelves; but according to their appearances, and as they are conceived in common opinion. As,

Joſh. 10. 12, 14. *Galilæus* maintains the literal ſenſe of this place; towards the end of that treatiſe, which he calls *Nov. Antiq. pat. doctrina.*

(1.) When he ſays, *Sun, ſtand thou ſtill upon* Gibeon, or over *Gibeon*. Now the whole Earth being ſo little in compariſon to the body of the Sun, and but as a Point, in reſpect of that Orb wherein the Sun is ſuppoſed to move; and *Gibeon* being, as it were,

but

but a Point of this Globe of Earth: therefore the words cannot be understood properly, but according to appearance. 'Tis probable that *Joshua* was then at *Azecha*, a little East from *Gibeon*, and the Sun being somewhat beyond the Meridian, did seem unto him, as he was in that place, to be over against *Gibeon*; and in reference to this appearance, and vulgar conceit, does he command it to stand still upon that place.

Tostat. *in locum. Quæst.* 16, 17. Arias Montanus *in locum.*

(2.) And so, secondly, for that other expression; *And thou Moon in the Valley of* Ajalon. This Planet was now a little East from the Sun, it being about three or four dayes old, as Commentators guess. *Ajalon* was three miles from *Gibeon* Eastward, and *Joshua* commanded the Moon to stand still there; because unto him it did then seem to be over against that Valley; whereas, 'tis certain, if he had been there himself, it would still have seemed to be as much distant from him. Just as Men commonly speak in shewing another the Stars; we point to a Star over such a Chimney, or such a Tree, because to us it appears so; whereas the Star in it self is not sensibly more over them, than it is over us. So that in this phrase likewise the Holy Ghost doth conform himself unto the appearance of things, and our grosser conceit.

Tostat. *ib. Quæst.* 18. Serrarius *in Josh.* 10 *Quæst.* 21, 22.

(3.) *And the Sun stood still in the midst of Heaven.* Now to speak properly, and as the thing is in it self, Heaven has no midst but the Centre; and therefore, this also must

must be interpreted in reference to the opinion of the Vulgar; and by the midst of Heaven, we are to understand such a place as was not very near to either of the ends, the East or West.

(4.) *And there was no day like that before it, or after it:* Which words are not to be understood absolutely, for there are always longer days under the Poles: but in respect to the opinion of the Vulgar, that is, there was never any day so long which these ignorant People knew of.

3. As for this last place, concerning the Sun's returning ten degrees in the Dial of *Ahaz*; I think it may probably be affirmed, That it is to be understood only concerning the Shadow: which though it do necessarily happen in all Horizontal Dials, for any Latitude betwixt the Tropicks: And so consequently in all Declining Dials, the Elevation of whose Pole is less than the Sun's greatest Declination; as *Clavius, de Horol. cap.* 21. observes: Yet the Circumstances of this relation in Scripture, makes the Event to differ from that other which is common and natural; which against its nature did seem to go backwards, when as the Sun it self was not in the least manner altered from its usual course. Of this opinion were *Abarbinell, Arius Montanus, Burgensis, Vatablus Sanctius*, &c.

2 King 20. 11, Isa. 38.8.

The Reasons for it may be these;

1. The Miracle is proposed only concerning the Shadow; *Wilt thou that the Shadow*

shall

ſhall aſcend or return by ten degrees? There being not in the offer of this Wonder, any the leaſt mention made concerning the Sun's going backwards.

2. 'Tis likely we ſhould have had ſome intimation concerning the extraordinary length of the Day, as it is in that of *Joſhua*; but in this relation, the chief matter that the ſtory takes notice of, is the alteration of the Shadow.

3. Had it been by the ſuppoſed return of the Sun's Body, this had been a greater Miracle, than thoſe which were performed upon more ſolemn occaſions; it had been more wonderful than its ſeeming reſt in *Joſhua*'s time; than the ſupernatural Eclipſe at our Saviour's Death, when the Moon was in the full. And then it is not likely, that the Holy Ghoſt, in relating of this Miracle, ſhould chiefly inſiſt in expreſſing how the Shadow returned, and that only in the Dial of *Ahaz*.

4. This Sign did not appear in the Sun it ſelf; becauſe in 2 *Chron.* 32. 31. 'tis ſaid, That *the Embaſſadors of the King of* Babylon *did come unto* Hezekiah, *to enquire of the Wonder that was done in the Land*; and therefore it ſeems the Miracle did not conſiſt in any change of the Heavens.

5. If it had been in the Sun, it would have been as well diſcerned in other parts of the World, as in the Land of *Judea*. And then,

1. What

1. What need the King of *Babylon* ſend thither to enquire after it? If you reply, becauſe it was occaſioned by *Hezekiah*'s Recovery. I anſwer, 'Tis not likely that the Heathens would ever believe ſo great a Miracle ſhould be wrought, meerly for a Sign of one Man's recovery from a Diſeaſe; but would rather be apt to think that it was done for ſome more remarkable purpoſe, and that by ſome of their own Gods, unto whom they attributed a far greater power, than unto any other. 'Tis more probable, that they might hear ſome flying Rumour of a Miracle that was ſeen in *Judea*; which, becauſe it hapned only in *Hezekiah*'s Houſe and Dial, and that too upon his recovery from a dangerous ſickneſs, they might be more apt to believe that it was a ſign of it.

2. Why have we no mention made of it in the Writings of the Ancients? It is no way likely, that ſo great a Miracle as this was (if it were in the Sun) ſhould have been paſſed over in ſilence; Eſpecially, ſince it hapned in thoſe later Times, when there were many Heathen Writers that flouriſhed in the World, *Heſiod*, *Archilochus*, *Symonides*; and not long after, *Homer*, with divers others; and yet none of them have the leaſt mention of any ſuch Prodigy. We have many relations of Matters that were leſs obſervable, which were done about that Time; the Hiſtory of *Numa Pompilius*, *Gyges*; the fight betwixt the three Brethren, with

with divers such stories. And 'tis scarce credible, that this should have been omitted amongst the rest.

Nay, we have (as many guess) some hints from prophane Antiquity, of the Miracle wrought by *Joshua*. Unto which, 'tis thought, the Ancients did allude, in the Fable of *Phaëton*, when the Sun was so irregular in his course, that he burnt some part of the World. And questionless then, this which hapned in later Times, would not have been so wholly forgotten. 'Tis an Argument urged by * *Origen*, That the Eclipse at our Saviour's Passion was not universal, because no prophane Author of those times mentions it. Which Consequence is the very same with that which is urged in this case: But by the way, his Antecedent was false, since † *Tertullian* affirms, That it was recorded among the Roman *Annals*.

* *Tract. 35. in Mat*

† *Apologet. cap. 21.*

Now, as for that story in *Herodotus*, where after he had related the flight of *Senacherib*, he tells us, how the Sun did, four times in the space of 10340 Years, invert his course, and rise in the West; which would seem so unto other Nations, if he had only returned, as many conclude, from this Scripture. As for this story, (I say) it cannot well be urged as pertinent to the present business, because it seems to have reference unto Times that never were.

Lib. 2.

So that all these things being well considered, we shall find it more probable, that

this Miracle doth consist in the return of the Shadow.

Isa. 38 8. Jona. 4 8. If you Object, That the Scripture does expressly say, *The Sun it self returned ten degrees.* I answer, 'Tis a frequent manner of speech in Scripture, to put the Cause for the Effect; as that in *Jonas*, where 'tis said, Jona. 4 8. That *the Sun did beat upon the Head of* Jonas; that is, the Beams of the Sun. So that of Psal. 121. 6. the *Psalmist*, *The Sun shall not smite thee by Day*; that is, the heat which proceeds from the Sun's reflection. In the same sense may the phrase be understood in this place; and the Sun may be said to return back, because the Light, which is the effect of it, did seem to do so; or rather, because the Shadow, which is the effect of that, did change its course.

This later Scripture then, will not at all make to the present purpose: as for those of the two former kinds, I have already answered, That they are spoken in reference to the appearance of things, and vulgar Opinion. For the further illustration of which, I shall endeavour to confirm these two particulars.

1. That the Holy Ghost, in many other places of Scripture, does accommodate his Expressions, unto the error of our Conceits; and does not speak of divers things as they are in themselves, but as they appear unto us. Therefore 'tis not unlikely, that these Phrases also may be liable unto the same interpretation.

2. That

2. That divers Men have fallen into great Absurdities, whilst they have looked for the Grounds of Philosophy, from the words of Scripture; and therefore it may be dangerous, in this Point also, to adhere so closely unto the Letter of the Text.

PROP. III.

That the Holy Ghost, in many places of Scripture, does plainly conform his Expressions unto the Errors of our Conceits; and does not speak of divers things as they are in themselves, but as they appear unto us.

THere is not any particular by which Philosophy hath been more endamaged, than the ignorant superstition of some Men; who, in stating the Controversies of it, do so closely adhere unto the meer words of Scripture. *Quamplurima occurrunt in libris sacris ad naturam pertinentia*, &c. They are the words of * *Vallesius*. 'There are sundry things in Holy Writ, concerning Natural Points, which most Men think are not 'so to be understood, as if the Holy Ghost 'did intend to unfold unto us any thing in 'that kind: but referring all to the salvation of our Souls, does speak of other matters according to common Opinion. And

* *Proam. ad Phil. Sacram.*

a little after, *Ego, divina hæc eloquia*, &c. 'I for my part am perſuaded, that theſe 'Divine Treatiſes, were not written by the 'Holy and Inſpired Pen-men, for the Inter- 'pretation of Philoſophy, becauſe God left 'ſuch things to be found out by Mens labour 'and induſtry. But yet, whatſoever is in 'them concerning nature, is moſt true; as 'proceeding from the God of Nature, from 'whom nothing could be hid. And queſtionleſs, all thoſe things which the Scripture does deliver concerning any natural Point, cannot be but certain and infallible, being underſtood in that ſenſe, wherein they were firſt intended; but now that it does ſpeak ſometimes according to common opinion, rather than the true nature of the things themſelves, was intimated before; wherefore (by the way) * *Fromondus* his triumph upon the latter part of this Quotation, is but vain, and to no purpoſe. 'Tis a good rule ſet down by a learned † Commentator, to be obſerved in the interpretation of Scripture: *Scriptura ſacra ſæpè non tam ad veritatem ipſam, quam ad hominum opinionem, ſermonem accommodat*; that it does many times accommodate its expreſſions, not ſo much to the Truth it ſelf, as to Mens Opinions. And in this ſenſe is that Speech of *Gregory* concerning Images and Pictures, attributed by ‖ *Calvin* unto the Hiſtory of the Creation, *viz. Librum eſſe idiotarum*; That it is a Book for the ſimpler and ignorant People. For it being written to inform

* *Veſt. Trac.* 3. *cap.* 2.

† Sanctius *in Iſa.* 13. 5. *Item in Zachar. lib.* 9. *num.* 45.

‖ *Calvin in init. in Gen.* 1.

form them, as well as others, 'tis requisite that it should use the most plain and easy expressions. To this purpose likewise is that of * *Mersennus*, *Mille sunt Scripturæ loca*, &c. 'There are very many places of Scripture, 'which are not to be interpreted according 'to the Letter; and that for this reason, 'because God would apply himself unto our 'capacity and sense: *Præsertim in iis, quæ ad res naturales, oculisque subjecta pertinent*; more especially in those things which concern Nature, and are subject to our Eyes. And therefore in the very same place, tho he be eager enough against *Copernicus*, yet he concludes that Opinion not to be a Heresy; because (saith he) those Scriptures which seem to oppose it, are not so evident, but that they may be capable of another Interpretation: Intimating, that it was not unlikely they should be understood in reference to outward appearance, and common opinion: And that this manner of speech is frequently used in many other places of Scripture, may be easily manifest from these following Examples. Thus tho the Moon may be proved, by infallible observation, to be less than any of the visible Stars; yet because of its appearance, and vulgar opinion, therefore doth the Scripture, in Comparison to them, call it one of the Great Lights. Of which place, saith *Calvin*, *Moses populariter scripsit, nos potius respexit quam sydera. Moses* did not so much regard the Nature of the thing, as our Capacity; and

* *In Gen. c.* 1. *v.* 10. *art.* 6.

V. Hiero. *in Jer.* 28. Aquinas *in Job* 26. 7.

Gen. 1. 16. Ps. 136. 7.

therefore uses a popular phrase: so as ordinary People, without the help of Arts and Learning, might easily understand him. And in another place, *Non fuit Spiritus Sancti concilium Astrologiam docere:* 'It was 'not the purpose of the Holy Ghost to teach 'us Astronomy: but being to propound a 'Doctrine, that concerns the most rude and 'simple People, he does (both by *Moses* 'and the Prophets) conform himself unto 'their phrases and conceits: lest any should 'think to excuse his own ignorance with the 'pretence of difficulty, as Men commonly 'do in those things which are delivered after a learned and sublime manner. Thus *Zanchy* likewise, *Mosis majorem rationem habuit nostri humanique judicii,* &c. 'When 'Moses calls the Moon a Great Light, he 'had a more especial reference to Mens Opinions of it, than to the truth of the thing 'it self, because he was to deal with such, 'who do judg usually, rather by their Sense, 'than by their Reason. Nor will that distinction of *Frontendus*, and others, avoid this interpretation, when he tells us of *Magnus Materialis*; which refers to the bulk and quantity of the Body: and *Magnus Formalis*, which imports the greatness of its Light. For we grant, that it is really unto us a greater Light than any of the Stars, or than all of them together: yet there is not any one of them, but is in it self a bigger Light than this: And therefore, when we say this speech is to be understood according to its ap-

Comment. in P s. 136.

* *De operibus Dei, par. 2. li. 6. cap. 1.*

appearance, we do not oppose this to reality; but 'tis implied, that this reality is not absolute, and in the nature of the thing it self, but only relative, and in reference to us. I may say, a Candle is a bigger Light than a Star, or the Moon, because it is really so to me. However any one will think this to be spoken, only in relation to its appearance, and not to be understood as if the thing were so in it self. But (by the way) it does concern *Fromondus* to maintain the Scripture's Authority, in revealing of natural Secrets; because, from thence it is that he fetches the chief Argument for that strange Assertion of his, concerning the heaviness of the Wind; where *Job* says, that *God makes the weight for the Wind.* Thus likewise, because the common People usually think the Rain to proceed from some Waters in the *Expansum*: therefore doth *Moses*, in reference to this erroneous Conceit, tell us of Waters above the Firmament, and the Windows of Heaven: Of which, saith *Calvin*, *Nimis serviliter literæ se astrinxerunt*, &c. 'Such Men too servilely tie themselves unto the Letter of the Text, who 'hence conclude, that there is a Sea in the 'Heavens: when as we know, that *Moses* 'and the Prophets, to accommodate themselves unto the capacity of ruder People, 'do use a vulgar expression; and therefore 'it would be a preposterous course, to reduce their phrases unto the exact Rules of 'Philosophy. Let me add, that from this

De Meteor. lib. 4. c 2. art. 5.

Job 28. 25

Comment. in Psalm. 148. 4.

mistake, 'tis likely did arise that groundless observation of the ancient Jews; who would not admit any to read the beginning of *Genesis*, till he was arrived to thirty Years of Age. The true reason of which, was this; not because that Book was harder than any other; but because *Moses* conforming his expression to vulgar Conceits, and they examining of them by more exact rules of Philosophy, were fain to force upon them many strange Allegories, and unnatural Mysteries.

Thus also, because for the most part we conceive the Stars to be innumerable, therefore doth the Holy Ghost often speak of them in reference to this opinion. So *Jeremy*, *As the Hoast of Heaven cannot be numbred, neither the Sand of the Sea measured, so will I multiply the Seed of David*: So likewise when God would comfort *Abraham* with the promise of a numberless Posterity, he bids him look up to Heaven, and tells him, that his Seed should be like those Stars for number: Which, saith * *Clavius*, *Intelligendum est secundum communem sententiam vulgi, existimantis infinitam esse multitudinem stellarum, dum eas nocte serena confusè intuetur*; is to be understood according to the common opinion of the Vulgar, who think the Stars to be of an infinite multitude, whilst they behold them all (as they seem confused) in a clear Night. And though many of our Divines do commonly interpret this Speech to be a *Hyperbole*; yet being well considered,

Jer. 33. 22.

Gen. 15. 5.

* *In 1. cap. Sphæra.*

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we shall find that *Abraham*'s Posterity, in some few Generations, were far more than there are visible Stars in the Firmament; and of such only does God speak, because he bids *Abraham* look up to the Heavens.

Now all these, even unto six differences of Magnitude, are reckoned to be but 1022. True indeed, at the first viewing of the Heavens, it may seem an incredible thing, that they should be of no greater a number; but the reason of this is, because they appear scattered and confused; so that the eye cannot place them in any such order, as to reckon them up, or take any distinct survey of them. Now 'tis a known truth, *Quod fortius operatur pluralitas partium, ubi ordo abest; nam inducit similitudinem infiniti, & impedit comprehensionem:* That a plurality of parts, without order, has a more strong operation, because it has a kind of seeming infinity, and so hinders comprehension. And then besides, there are more appearances of Stars many times, than there are bodies of them; for the Eye, by reason of its weakness and disability, to discern any thing at so great a distance; as also, because of those Beams which proceed from such remote Bodies, in a twinkling and wavering manner, and so mix and confound themselves at their entrance into that Organ; it must needs receive more representations than there are true bodies. But now, if a Man do but leisurely and distinctly compare the Stars of the Heaven with those of this number, that are

Sir *F. Bac.* Table of Colours, *numb.* 5.

are noted in a Cœlestial Globe, he shall scarce find any in the Sky which are not marked with the Globe; nay, he may observe many in the Globe, which he can scarce at all discern in the Heavens.

Now this number of the Stars, is commonly distributed into 48 Constellations; in each of which, though we should suppose ten thousand Stars, (which can scarce be conceived) yet would not all this number equal that of the Children of *Israel*. Nay, 'tis the assertion of *Clavius*, that *Abraham*'s Posterity, in some few Generations, were far more than there could be Stars in the Firmament, though they stuck so close that they touched one another: And he proves it thus; A great Circle in the Firmament, does contain the diameter of a Star of the first Magnitude 14960 times. In the Diameter of the Firmament, there are contained 4760 Diameters of such a Star: Now if we multiply this for a Diameter, the Product will be 71209600, which is the full number of Stars, that the eighth Sphere (according to *Ptolomy*'s grounds) would contain, if they stood so close that they touched one another.

In prim. c. Sphæra.

Num. 1. 46 The Children of *Israel* were reckoned, at their going out of *Egypt*, 603550, of such as were one and twenty Years old, and upwards, and were able to go to War; besides Children, and Women, and Youths, and old Men, and the Levites; which in probability, did always treble the other number.

ber. Now if they were so many at one time, we may well conceive, that in all those several Generations, both before and since, the number was much augmented; and long before this time, did far exceed this supposed multitude of the Stars. From all which we may infer, that the Scripture-expressions in this kind, are to be understood according to appearance and common opinion.

Another place usually cited for the same purpose, to shew that the Holy Ghost does not speak exactly concerning natural Secrets; is that in the *Kings* and *Chronicles*, which relates unto us the measure of *Solomon's* brazen Sea, whose Diameter was ten Cubits, and its circumference thirty; whereas to speak Geometrically, the more exact proportion betwixt the Diameter and the Circumference, is not as ten to thirty, but rather as seven to twenty two. 1 Kin. 7. 23. 2 Chro. 4. 2.

But against this 'tis * objected by our Adversaries, *Roff. l. 1. sect 1. c. 8.

1. This Sea was not perfectly round, but rather inclining to a semicircular Form, as *Josephus* affirms. *Ant. Jud. lib. 8. c. 2.*

I reply: If it were so, yet this is so much from helping the matter, that it makes it much worse; for then the disproportion will be far greater.

But secondly, Scripture, which is to be believed before *Josephus*, does tell us in express tearms, that it was round all about, 1 *King.* 7. 23.

2. The

Rosf. *Ibid.* 2 The proportion of the Diameter to the Circumference, is not exactly the same as seven to two and twenty, but rather less. I answer, Though it be, yet 'tis nearer unto that, than any other number.

Ibid. 3. The Scripture does but according to its usual custom, suppress the less number, and mention only that which is bigger and more full. So in some * places, *Abraham*'s Posterity is said to remain in the Land of *Ægypt* for four hundred Years; when as notwithstanding † other Scriptures tell us, that they tarried there thirty Years longer. Thus likewise in one * place, the number of *Jacob*'s House, who came into *Ægypt*, is reckoned to be seventy; whereas ‖ elsewhere, they are said to be seventy five.

* Gen. 15. 13. Acts 7. 6.

† Exod. 12. 41. Gal. 3. 17.

* Gen. 46. 27. ‖ Act. 7. 4.

I answer: All this is so far from destroying the force of the present Argument, that it does rather confirm it, and more clearly evidence unto us, that the Scripture does not only, not speak exactly in these subtil and more secret Points of Philosophy, but also, in the ordinary obvious numbring of things, does conform unto common custom, and often use the round number for the whole.

† Fromond. *Vesta. 4 trac. 3. c. 2.* 4. 'Tis yet objected by † another Adversary, That we have no reason to expect, the Holy Ghost should reveal unto us this Secret in Nature, because neither *Archimedes*, nor any other, had then found it out. I reply, and why then should we think that the Scripture must needs inform us of the Earths

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Motion; when as neither *Pythagoras*, nor *Copernicus*, nor any else, had then discovered it?

5. In taking the compass of this Vessel, they measured somewhat below the brim, where it was narrower than at the top, and so the Circumference there, might be exactly but thirty Cubits; whereof its Diameter was ten. *Ibid.*

I answer: 'Tis evident this is a meer shift, there being not the least ground for it in the Text. And then besides, why might not we affirm, That the Diameter was measured from that place, as well as the Circumference? since 'tis very probable, that the Holy Ghost did speak *ad idem*; and not tell us the breadth of one place, and the compass of another. So that all our Adversaries Evasions cannot well avoid the force of the Argument that is taken from this Scripture.

Again, common People usually conceive the Earth to be such a Plain, as in its utmost parts is terminated by the Heavens, so that if a Man were in the farthermost Coasts of it, he might touch the Sky. And hence also, they think that the reason why some Countries are hotter than others, is, because they lie nearer unto the Sun. Nay, *Strabo* tells us of some Philosophers too, who in this Point have grosly erred; affirming, that there was a place towards the utmost Coasts of *Lusitania*, where a Man might hear the noise that the Sun made, as he quench'd his Beams

Beams in his descent to the Ocean; which, though it be an absurd mistake, yet we may note, that the Holy Ghost, in the expression of these things, is pleased to conform himself unto such kind of vulgar and false Conceits; and therefore, often speaks of the * *Ends of the Heaven*, and the † *Ends of the World*. In this sense, they that come from any far Country, are said to come from the *End of Heaven*, Isa. 13. 5. And in another place, *From the Side of the Heavens*, Deut. 4. 32. All which Phrases do plainly allude unto the error of vulgar Capacities; (saith *Sanctius*) which hereby is better instructed, than it would be by more proper expressions.

* Ps. 19. 6. Mat. 24. 31
† Psal. 22. 27, &c.

Comment. in Isa. 13. 5

Thus likewise, because ignorant People cannot well apprehend how so great a weight as the Sea and Land, should hang alone in the open Air, without being founded upon some *Basis* to uphold it: therefore in this respect also, does Scripture apply it self unto their Conceits, where it often mentions the *Foundations of the Earth*. Which Phrase, in the Letter of it, does manifestly allude unto Mens Imaginations in this kind.

Job 38. 4. Ps. 102. 25

Thus also the common People usually conceive the Earth to be upon the Water; because, when they have travelled any way as far as they can, they are at length stopped by the Sea. Therefore doth Scripture, in reference to this, affirm, That *God stretched the Earth upon the Waters; founded the Earth*

Ps. 136. 6. & 24. 2.

upon

upon the Seas, and established it upon the Floods: Of which Places, saith *Calvin*, *Non disputat Philosophice David, de terræ situ; sed popularis in loquens, ad rudium captum se accommodat*: 'Twas not *David*'s intent to speak philosophically concerning the Earth's scituation; but rather, by using a popular Phrase, to accommodate his Speech unto the Capacities of the ruder People.

In this sense likewise are we to understand all those places of Scripture, wherein the Coasts of Heaven are denominated from the relations of Before, Behind, the right hand, or the left. Which do not imply (saith *Scaliger*) any absolute difference in such places, but are spoken merely in reference to Men, estimations, and the common opinion of those People, for whom the Scriptures were first penned. Thus because it was the opinion of the Jewish Rabbies, that Man was created with his Face to the East: therefore the Hebrew word קדם, signifies *ante*, or the East; אחור, *Post*, or the West; ימין, *Dextra*, or the South; שמאל, *Sinistra*, or the North. You may see all of them put together in that place of *Job*, *Behold, I go forward, and he is not there; and backward, but I cannot perceive him; on the left hand, where he doth work, but I cannot behold him. He hideth himself on the right hand, that I cannot see him.* Which expressions, are by some Interpreters referred unto the four Coasts of Heaven, according to the common use of those original words. From hence

* Subtil. Exercit. 67.

Job. 23. 8, 9.

hence it is, that many of the Ancients have concluded Hell to be in the North, which is signified by the left hand: unto which side our Saviour tells us, that the Goats shall be
Mat. 25. 33 divided. Which opinion likewise seems to be favoured by that place in *Job*; where 'tis
Job 26. 6, 7. said, *Hell is naked before God, and destruction hath no covering.* And presently 'tis added, *He stretched out the North over the empty place.* Upon these grounds, St. *Jerome* interprets that Speech of the Preacher, *Eccles.* 11. 3. *If the Tree fall toward the South, or towards the North, in the place where the Tree falleth, there shall it be.* Concerning those who shall go either to Heaven or Hell. And in this sense also does some expound that of *Zachary* 14. 4. where 'tis said, *that the Mount of Olives shall cleave in the midst; half of it shall remove towards the North, and half of it towards the South.* By which is intimated, that amongst those Gentiles, who shall take upon them the Profession of Christ; there are two sorts; Some that go to the North, that is, to Hell; and others to the South, that is, to Heaven. And therefore it is (say they)
* Jer. 1. 14, 15. item c. 4. 6 & 6. 1. † Li. de mar. popul. ca. 4. that God so * often threatens Evil out of the North: And upon this ground it is, (saith † *Besoldus*) that there is no Religion that worships that way. We read of the *Mahumetans*, that they adore towards the South; the *Jews* towards the West; *Christians* towards the East, but none to the North.

But

But of this only by the way. However, certain it is, that the Holy Ghoſt does frequently in Scripture ſet forth the ſeveral Coaſts of Heaven by thoſe relative terms of right hand and left hand, *&c.* which expreſſions do not denote any real intrinſecal difference between thoſe places, but are rather fitted for the apprehenſion of thoſe Men, from whoſe fancy it is that they have ſuch denominations. And though *Ariſtotle* concludes theſe ſeveral Poſitions to be natural unto the Heavens, yet his Authority in this particular is not available, becauſe he delivers it upon a wrong ground, ſuppoſing the Orbs to be living Creatures, and aſſiſted with Intelligences. We may obſerve, that the meaning of theſe Coaſts, by the relations of right hand and left hand, *&c.* is ſo far from having any ground in the nature of thoſe ſeveral places, that theſe relations are not only variouſly applied unto them by divers Religions (as was ſaid before) but alſo by divers Arts and Profeſſions. Thus, becauſe *Aſtronomers* make their Obſervations towards the South parts of the Horizon, where there be moſt Stars that riſe and ſet; therefore do they account the Weſt to be at their right hand, and the Eaſt their left. The *Coſmographers*, in taking the Latitude of Places, and reckoning their ſeveral Climates, muſt look towards the North Pole; and therefore, in their phraſe, by the right hand, is meant the Eaſt; and by the left hand, the Weſt: And thus (ſaith * *Plutarch*) are we

De Cœlo, lib. 2. c. 2.

* *De placit. Philoſ. lib. 2. c. 10.*

to understand these expressions in *Pythagoras*, *Plato*, *Aristotle*. The Poets count the South to be towards the left, and the North the right hand. Thus † *Lucan*, speaking of the *Arabians* coming unto *Thessaly*, says:

† *Lib.* 3.

Ignotum vobis Arabes venistis in orbem:
Umbras mirati nemorum, non ire sinistras.

The *Augures* taking their Observations at the East, count the South to be at their right hand, and the North their left: So that these Denominations have not any real ground in the nature of the things, but are imposed upon them by the Scripture phrase, in reference to the account and opinion of the *Jews*.

D. Hakwel *Apol. l.* 1. *c.* 1. *sect.* 2.

Thus also, because heretofore it was generally received, that the Heart was the principal Seat of the Faculties; therefore doth the Spirit apply himself unto this common Tenent; and in many places, attributes Wisdom and Understanding to the Heart. Whereas, to speak properly, the reason and discursive Faculties have their principal residence in the Head (saith *Galen* and *Hippocrates*, together with the generality of our later Physicians) because they are hindred in their Operations by the distempers of that part, and recovered by Medicines applied unto it.

Prov. 8 5. & 10. 8. Eccl. 1. 13, 16, 17. & 8. 5.

So likewise are we to understand those other places; *Isa.* 59. 5. where some Translations read it, *Ova Aspidum ruperunt*, they have

have broken the Vipers Eggs; alluding to that common but fabulous ſtory of the Viper, who breaks his paſſage through the Bowels of the Female. So *Pſal.* 58. 4, 5. where the Prophet ſpeaks of the deaf Adder, *that ſtops her Ears againſt the Voice of the Charmer.* Both which relations (if we may believe many Naturaliſts) are as falſe as they are common: and yet, becauſe they were entertained with the general opinion of thoſe days, therefore doth the Holy Ghoſt vouchſafe to allude unto them in Holy Writ. 'Tis a plain miſtake of *Fromondus*, when in anſwer to theſe places, he is fain to ſay, that they are uſed proverbially only, and do not poſitively conclude any thing. For when *David* writes theſe words, that they are *like the deaf Adder, which ſtoppeth her Ears*, &c. This affirmation is manifeſtly implied, That the deaf Adder does ſtop her Ears againſt the Voice of the Charmer: which becauſe it is not true in the Letter of it, (as was ſaid before) therefore 'tis very probable that it ſhould be interpreted in the ſame ſenſe wherein here it is cited. *Veſta. Tract 3. cap. 3.*

In reference to this alſo, we are to conceive of thoſe other expreſſions; *Cold cometh out of the North*, Job 37. 9. And again, *Fair Weather comes out of the North*, ver. 22. So *ver.* 17. *Thy Garments are warm, when he quieteth the Earth by the South Wind.* And, Prov. 25. 23. *The North Wind driveth away Rain.* Which Phraſes do not contain in them any abſolute general Truth, but can

ſo far only be verified, as they are referred to ſeveral Climats: and though unto us who live on this ſide of the Line, the North Wind being coldeſt and drieſt; and on the the contrary, the South Wind moiſt and Warm, by reaſon that in one of theſe places, there is a ſtronger heat of the Sun to exhale moiſt Vapours, than in the other: yet it is clean otherwiſe with the Inhabitants beyond the other Tropick; for there the North Wind is the hotteſt, and moiſt; and the South the coldeſt and dry: So that with them, theſe Scriptures cannot properly be affirmed, that *Cold, or that fair Weather cometh out of the North*; but rather on the contrary. All which notwithſtanding, does not in the leaſt manner derogate from the truth of theſe Speeches, or the omniſcience of the Speaker; but do rather ſhew the Wiſdom and Goodneſs of the bleſſed Spirit, in vouchſafing thus to conform his Language unto the capacity of thoſe People unto whom theſe Speeches were firſt directed. In the ſame ſenſe are we to underſtand all thoſe places where *the Lights of Heaven* are ſaid to be darkned, *and the Conſtellations not to give their Light*, Iſa. 13. 10. Not as if they were abſolutely in themſelves deprived of their Light, and did not ſhine at all; but becauſe of their appearance to us: and therefore, in another place anſwerable to theſe, God ſays, *he will cover the Heavens*, and ſo make the Stars thereof dark, *Ezek.* 37. 2. Which argues, that they themſelves were not deprived

Joel 2. 31. *Item* c. 3. 15.

privéd of this Light (as thoſe other Speeches ſeem to imply) but we.

In reference to this, likewiſe are we to conceive of thoſe other expreſſions, that *the Moon ſhall bluſh, and the Sun be aſhamed*, Iſa. 24. 23. That *they ſhall be turned into Blood*, Matth. 24. 29. Not that theſe things ſhall be ſo in themſelves, (ſaith S. *Jerome*) but becauſe they ſhall appear ſo unto us. Thus alſo, *Mark* 13. 25. *The Stars ſhall fall from Heaven*; that is, they ſhall be ſo wholly covered from our ſight, as if they were quite fallen from their wonted places. Or if this be underſtood of their real Fall, as it may ſeem probable by that place in *Rev.* 6. 13. *And the Stars of Heaven fell unto the Earth, even as a Fig-tree caſteth her untimely Figs, when ſhe is ſhaken by a mighty Wind:* then it is to be interpreted, not of them that are truly Stars, but them that appear ſo: alluding unto the opinion of the unskilful Vulgar, (ſaith * *Sanctius*) that think the Meteors to be Stars. And † *Merſennus*, ſpeaking of the ſame Scripture, ſays, *Hoc de veris Stellis minimè volunt interpretes intelligi, ſed de Cometis & aliis ignitis Meteoris:* Interpreters do by no means underſtand this of true Stars, but of the Comets, and other fiery Meteors. Though the falling of theſe be a natural event, yet may it be accounted a ſtrange Prodigy, as well as an Earthquake, and the darkning of the Sun and Moon, which are mentioned in the verſe before.

Comment. in Joel 3.

Comment. in Iſa. 13. 5

†*Commen. in* Gen. 3. v. 10, *art.* 6.

In reference to this, doth the Scripture ſpeak of ſome common natural effects, as if their true cauſes were altogether inſcrutable, and not to be found out, becauſe they were generally ſo eſteemed by the Vulgar. Joh. 3. 8. Thus of the Wind it is * ſaid, *That none know whence it cometh, nor whither it goeth.* †Jer. 10. 13. *Item* c. 51. 16. In another † place, God is ſaid *to bring it out of his Treaſures:* And (a) elſewhere it is called *the* (b) *Breath of God.* And ſo likewiſe of the Thunder; concerning which (c) *Job* propoſes this queſtion, *The Thunder of his Power who can underſtand?* And therefore too (d) *David* does ſo often ſtile it, *the Voice of God.* All which places ſeem to imply, that the cauſe of theſe things was not to be diſcovered, which yet later Philoſophers pretend to know: So that according to their conſtruction, theſe phraſes are to be underſtood, in relation unto their ignorance unto whom theſe Speeches were immediatly directed.

(a) Job 37. 10.
(b) מפח
(c) Job 26. 14.
(d) Pſ. 2. 9. & 3. 4, &c.

For this reaſon is it: Why, tho there be in nature many other cauſes of Springs and Rivers than the Sea, yet *Solomon* (who was a great Philoſopher, and perhaps not ignorant of them) does mention only this, becauſe moſt obvious, and eaſily apprehended by the Vulgar. Unto all theſe Scriptures, I might add that in *Amos* 5. 8. which ſpeaks of the Conſtellation, commonly called the *Seven Stars*; whereas, later diſcoveries have found that there are but ſix of them diſcernable to the bare eye, as appears by

Eccl. 1. 7.

Job 9. 9. *Item* 38. 31.

Gallileus

Galilæus his Glaſs; the ſeventh of them being but a deceit of the eye, ariſing from their too great nearneſs; and if a Man try, in a clear Night, to number them diſtinctly, he ſhall find that there will ſometimes appear but ſix, and ſometimes more. *Vide* Fromond. *Mite. l. 3. c. 1. Art. 1.*

True indeed, the original word of this Scripture כִּימָה, does not neceſſarily imply any ſuch number in its ſignification, but yet our Engliſh Tranſlation renders it the *ſeven Stars*; and if it had been expreſly ſo in the Original too, it might have ſpoken true enough, becauſe they are uſually eſteemed of that number. And when it had been ſaid, *He made the ſeven Stars, and Orion*, we might eaſily have underſtood the words thus: He made thoſe Conſtellations that are commonly known unto us under ſuch names.

From all theſe Scriptures, 'tis clearly manifeſt, that it is a frequent cuſtom for the Holy Ghoſt to ſpeak of natural Things, rather according to their appearance and common opinion, than the truth it ſelf. Now it is very plain, and our Enemies themſelves do grant it, that if the World had been framed according to the Syſteme of *Copernicus*, *Futurum eſſet ut vulgus, de Solis motu & Terræ ſtatu proinde ut nunc loqueretur.* The vulgar phraſe would have been the ſame as now it is, when it ſpeaks of the Sun's Motion, and the Earth's ſtanding ſtill. Fromond. *Antar. c. 6.*

Wherefore 'tis not improbable, that ſuch kind of Scripture-expreſſions, are to be underſtood

derstood only in relation to outward appearances, and vulgar opinion.

PROP. IV.

That divers learned Men have fallen into great Absurdities, whilst they have looked for the Grounds of Philosophy from the words of Scripture.

IT has been an ancient and common opinion amongst the *Jews*, that the Law of *Moses* did contain in it, not only those things which concern our Religion and Obedience, but every Secret also that may possibly be known in any Art or Science; so that there is not a Demonstration in Geometry, or Rule in Arithmetick; not a Mystery in any Trade, but it may be found out in the *Pentateuch*. Hence it was (say they) that *Solomon* had all his Wisdom and Policy: Hence it was that he did fetch his Knowledg concerning the nature of Vegetables, from the Cedar of *Lebanon* to the Hysop that grows upon the Wall. Nay, from hence, they thought a Man might learn the Art of Miracles, to remove a Mountain, or recover the dead. So strangely have the learneder sort of that Nation been befooled, since their own Curse hath lighted upon them.

Schickard. Bechin. Hapern. *Disp.* 5. *num.* 8.

Not

Not much unlike this foolish superstition of theirs, is that custom of many Artists amongst us; who upon the invention of any new Secret, will presently find out some obscure Text or other to Father it upon; as if the Holy Ghost must needs take notice of every particular, which their partial Fancies did over-value.

Nor are they altogether guiltless of this Fault, who look for any Secrets of Nature from the words of Scripture; or will examine all its expressions by the exact Rules of Philosophy.

Unto what strange Absurdities this false Imagination of the learnedst *Jews* hath exposed them, may be manifest by a great multitude of Examples. I will mention only some few of them. Hence it is, that they prove the shin-bone of *Og* the Giant to be above three leagues long: Or (which is a more modest relation) that *Moses* being fourteen Cubits in stature, having a Spear ten ells in length, and leaping up ten Cubits, could touch this Giant but on the Ancle. All which, they can confirm unto you by a cabalistical interpretation of this story, as it is set down in Scripture. Hence it is, that they tell us of all those strange Beasts which shall be seen at the coming of the *Messias*: as first, the Ox, which *Job* calls *Behemoth*, that every day devours the Grass on a thousand Mountains; as you may see it in the * *Psalm*, where *David* mentions the Cattel, or בהמות upon a thousand Hills. If you ask

Schickard. *ib. Disp. 6. num. 2.*

Buxtor. Synag. Juda. c. 36.

*Ps. 50 10.

ask how this Beaſt does to find Paſture enough? they anſwer, that he remains conſtantly in one place, where there is as much Graſs grows up in the Night, as was eaten in the Day.

They tell us alſo of a Bird, which was of that quantity, that having upon a time caſt an Egg out of her Neſt, there were beaten down by the fall of it, three hundred of the talleſt Cedars, and no leſs than threeſcore Villages drowned. As alſo of a Frog, as big as a Town capable of ſixty Houſes; which Frog, notwithſtanding his greatneſs, was devoured by a Serpent, and that Serpent by a Crow; which Crow, as ſhe was flying up to a Tree, eclipſed the Sun, and darkned the World; by which you may gueſs, what a pretty Twig that Tree was. If you would know the proper Name of this Bird, you may find it in *Pſal.* 50. 11. where it is called שדי, or in our Tranſlation, the Fowl of the Mountains. It ſeems it was ſomewhat of kin to that other Bird they tell us of, whoſe Legs were ſo long, that they reached unto the bottom of that Sea, where there had been an Ax-head falling for ſeven Years together, before it could come to the bottom.

v. Parap. Chald.

Many other Relations there are, which contain ſuch horrible Abſurdities, that a Man cannot well conceive how they ſhould proceed from reaſonable Creatures. And all this ariſing from that wrong Principle of theirs; That Scripture did exactly contain

in

in it all kind of Truths; and that every meaning was true, which by the Letter of it, or by Cabaliſtical Interpretations, might be found out.

Now as it hath been with them, ſo likewiſe hath it hapned in proportion unto others; who by a ſuperſtitious adhering unto the bare words of Scripture, have expoſed themſelves unto many ſtrange Errors. Thus * S. *Baſil* holds, That next to the Sun, the Moon is bigger than any of the Stars, becauſe *Moſes* does call them only two great Lights.

* Enarrat. in Gen.

Thus others maintain, That there are Waters, properly ſo called, above the ſtarry Firmament, becauſe of thoſe vulgar expreſſions in Scripture, which in their literal ſenſe do mention them. Of this opinion were many of the Ancients, *Philo*, *Joſephus*; and ſince them the Fathers, (*a*) *Juſtin Martyr*, (*b*) *Theodoret*, (*c*) *Auſtin*, (*d*) *Ambroſe*, (*e*) *Baſil*, and almoſt all the reſt. Since them, ſundry other learned Men, as *Bede*, *Strabo*, *Damaſcen*, *Tho. Aquinas*, &c. If you ask for what purpoſe they were placed here? *Juſtin Martyr* tells us, for theſe two ends: Firſt, To cool the heat that might otherwiſe ariſe from the motion of the ſolid Orbs; and hence it is (ſay they) that *Saturn* is colder than any of the other Planets, becauſe tho he move faſter, yet he is nearer to theſe Waters. Secondly, To preſs and keep down the Heavens, leſt the frequency and violence of Winds, might break and ſcatter

(*a*) *Reſp. ad quæſt.* 93 *Orthod.*
(*b*) *Queſt.* 11. *ſup. Gen.*
(*c*) *De Civ. Dei, lib.* 11 *cap. ult.*
(*d*) *Hex. am. l.* 2. *c.* 2
(*e*) *Homil.* 3. *in Gen.*

ſcatter them aſunder; which Opinion, together with both its Reaſons, are now accounted abſurd and ridiculous.

*De Civit. Dei, l. 16. c. 23.

S. * *Auſtin* concludes the viſible Stars to be innumerable, becauſe Scripture-phraſes ſeem to imply as much.

That the Heavens are not round, was the opinion of (a) *Juſtin Martyr*, (b) *Ambroſe*, (c) *Chryſoſtom*, (d) *Theodoret*, (e) *Theophilact*; doubted of by (f) S. *Auſtin*, and divers others. Nay, S. *Chryſoſtom* was ſo confident of it, that he propoſes the queſtion in a triumphant manner: Πῶς εἰσιν οἱ σφαῖρο εἰδῆ οὐρανὸν εἶναι ἀποφαινόμενοι. Where are thoſe Men that can prove the Heavens to have a ſphærical Form? The reaſon of which was this, Becauſe 'tis ſaid in one Scripture, *that God ſtretched forth the Heavens as a Curtain*, Pſal. 104. 2. *and ſpreadeth them as a Tent to dwell in*, Iſa. 40. 22. And ſo in *Heb.* 8. 2. they are called *a Tent or Tabernacle*: which becauſe it is not ſphærical, therefore they conclude alſo, that the Heavens are not of that form; whereas now, the contrary is as evident as Demonſtration can make a thing. And therefore, * S. *Jerome* in his time, ſpeaking of the ſame Error, gives it this plain cenſure; *Eſt in Eccleſia ſtultiloquium, ſi quis Cœlum putet fornicis modo curvatum*, Eſaiæ *quem non intelligit ſermone deceptus*: 'Tis *fooliſh ſpeaking* in the Church, if any, through miſapprehenſion of thoſe words in *Iſaiah*, ſhall affirm the Heavens not to be round.

(a) *Reſpon. ad queſt.* 93.
(b) *Hexam. l.* 1. *c.* 6
(c) *Homil.* 14. *in Ep. ad Hebr.*
(d) *In ca.* 8. *Hebr.*
(e) *In idem c.*
(f) *In Gen. ad lit. l.* 1 *c.* 9. *Item l.* 2. *c.* 6.

* *Lib.* 3. *Comment. in* Gal. 5.

That

That the Seas not overflowing the Land, is a Miracle, was the opinion of (a) *Basil*, (b) *Chrysostom*, (c) *Theodoret*, (d) *Ambrose*, (e) *Nazianzen*; and since them, (f) *Aquinas*, (g) *Luther*, *Calvin*, *Marlorat*; with sundry others. Which they proved from these Scripture-expressions; that in *Job* 38. 8, 11. *Who hath shut up the Sea with doors, when it brake forth, as if it had issued out of the Womb; when I did break up for it my decreed place; and set bars and doors, and said, hitherto shalt thou come, and no further, and here shall the pride of thy Waves be staid.* So likewise, *Prov.* 8. 29. *God gave to the Sea his Decree, that the Waters should not pass his Commandment.* And *Jer.* 5. 22. *I have placed the Sand for a bound of the Sea, by a perpetual Decree, that they cannot pass it: and tho the Waves thereof toss themselves, yet can they not prevail; tho they roar, yet can they not pass over, that they turn not again to cover the Earth.* In all which places (say they) 'tis implied, that the Water of it self, were it not with-held from its own natural inclination, by a more special Power of God, would overflow the Land.

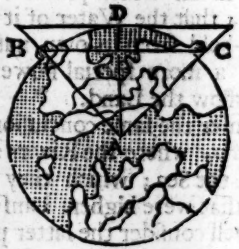
a) *Homil. 4. Hexam.*
b) *Comment in Job.*
c) *In Psal. 103.*
d) *Hexam. l. 3. c. 2, 3.*
e) *Orat. 34*
f) *Aquin. part. 1. quest. 69. art. 1.*
g) *Comment in Ps. 24. Item in Ps. 136. 6.*

Others infer the same conclusion from that in *Ecclesiastes*, where the Rivers are said to come from the Sea; which they could not do, unless that were higher. I answer; They should as well consider the latter part of that Scripture, which says, that the Rivers return to that place from whence they came, and then the force of this consequence will vanish.

vanish. To this purpose, some urge that speech of our Saviour, where he bids *Simon* to launch forth into the deep; the Latin word is, *in altum*; from whence they gather, that the Sea is higher than the Land. But this savours so much of Monkish Ignorance, that it deserves rather to be laughed at, than to be answered.

Luk. 5. 24. Εἰς τὸ βαθος.

But now if we consider the true Properties of this Element, according to the Rules of Philosophy; we shall find, that its not overflowing the Land, is so far from being a Miracle, that it is a necessary consequence of its Nature; and 'twould rather be a Miracle, if it should be otherwise, as it was in the general Deluge. The reason is, because the Water of it self must necessarily descend to the lowest place; which it cannot do, unless it be collected in a sphærical Form, as you may plainly discern in this Figure.



Where the Sea at D may seem to be higher than a Mountain at B, or C, because the rising

rising of it in the midſt, does ſo intercept our ſight from either of thoſe places, that we cannot look in a ſtreight Line from the one to the other. So that it may ſeem to be no leſs than a Miracle, by which the Sea (being a heavy Body) was with-held from flowing down to thoſe lower places of B, or C. But now, if you conſider that the aſcending of a Body, is its motion from the Centre; and deſcent, is its approaching unto it: you ſhall find, that the Sea to move from D, to B or C, is a motion of Aſcent, which is contrary to its nature, becauſe the Mountain at B, or C, are farther off from the Centre, than the Sea at D, the Lines A B, and A C, being longer than the other A D. So that for the Sea to keep always in its Channel, is but agreeable to its Nature, as being a heavy Body. But the meaning of thoſe Scriptures, is, to ſet forth the Power and Wiſdom of God; who hath appointed theſe Channels for it, and beſet it with ſuch ſtrong Banks, to withſtand the fury of its waves. Or if theſe Men do ſo much rely in natural Points, upon the bare words of Scripture, they might eaſily be confuted from thoſe other places, where God is ſaid to have founded the Earth upon the Seas, and eſtabliſhed it upon the Floods. From the literal interpretation of which, many of the Ancients have fallen into another Error; affirming, the Water to be in the lower place; and as a *baſis*, whereon the the weight of the Earth was born up. Of this

this opinion were (a) *Clemens Alexandrinus*, (b) *Athanasius*, (c) *Hilary*, (d) *Eusebius*, and others. So that it seems, if a Man should resolutely adhere to the bare words of the Scripture, he might find contradiction in it: of which, the natural meaning is altogether incapable. * S. *Jerome* tells us of some who would prove Stars to have understanding, from that place in *Isa.* 45. 12. *My hands have stretched out the Heavens, and all their Hoast have I commanded.* Now (say they) none but intelligent Creatures are capable of Precepts; and therefore, the Stars must needs have rational Souls. Of this opinion was * *Philo* the Jew: nay, many of the Rabbies conclude, that they do every hour sing praises unto God, with an audible real Voice. But of that in *Job* 38. 7. which speaks of *the Morning Stars singing together*. And *Psal.* 19. 3, 4. where 'tis said of the Heavens, that *there is no speech nor language where their Voice is not heard, and their words are gone to the ends of the World.* And whereas we translate that place in the tenth of *Joshua*, concerning the standing still of the Heavens; the original word, דום, does properly signify *Silence*; and according to their opinion, *Joshua* did only bid them hold their peace. From such grounds, 'tis likely did * *Origen* fetch his Opinion, that the Stars should be saved. I might set down many other the like Instances, were it not for being already weary of raking into the Errors of Antiquity, or uncovering the naked-

a) *Recog.* 8
b) *Orat. cont. Idolos.*
c) *In Psal.* 136. 6.
d) *In Ps.* 24.
* *Commen. in Isa. l.* 13
* *De plant. Noe.*
Tostatus *in Josh. c.* 10 *quest.* 13, 14.
* *Tom.* 1. *in Johan.*

nakedneſs of our Forefathers. That excuſe of * *Acoſta*, may juſtly ſerve to mitigate the Miſtakes of theſe Ancient Divines: *Facilè condonandum eſt patribus, ſi cum cognoſcendo colendóque Creatori toti vacarent, de creaturâ minus aptè aliquâ ex parte opinati ſint.* Thoſe good Men were ſo wholly buſied about the Knowledg and Worſhip of the Creator, that they had not leiſure enough for an exact ſearch into the Eſſence of the Creatures. However, theſe Examples that have been already cited, may ſufficiently manifeſt, how frequently others have been deceived, in concluding the Points of Philoſophy from the Expreſſions of Scripture. And therefore, 'tis not certain, but that in the preſent caſe alſo, it may be inſufficient for ſuch a manner of arguing.

* *De nat. novi orbis, lib.* 1 *c.* 2.

F PROP:

PROP. V.

That the Scripture, in its proper construction, does not any where affirm the Immobility of the Earth.

THe ſame Anſwer which was inſiſted on before, concerning the conformity of Scripture-expreſſions, to Mens capacity and common opinion, may well enough ſatisfy all thoſe Arguments, which ſeem thence to affirm the Earth's ſetledneſs and immobility; ſince this is as well agreeable to outward appearance, and vulgar apprehenſion, as the other.

But now, for more full ſatisfaction, I ſhall ſet down the particular places that are urged for it; which being throughly examined, we may plainly diſcern, that none of them, in their proper meaning, will ſerve to infer any ſuch concluſion.

One of theſe ſayings, is that of the Preacher, *Eccleſ.* 1. 4. *One Generation cometh, and another paſſeth, but the Earth endureth for ever*; where the original word is, עמדת, and the vulgar, *ſtat*; from whence our * Adverſaries conclude, that it is immoveable.

* Valleſius *Sacr. Phil. cap.* 62. Fuller, *Miſcell. l.* 1. *c.* 15. Pineda, *Comment. in locum.*

I anſwer: The meaning of the word, as it is here applied, is *permanet*; or as we tranſlate

translate it, *endureth*. For it is not the purpose of this place, to deny all kind of motion to the whole Earth: but that of Generation and Corruption, to which other things in it are liable. And though *Pineda*, and others, keep a great deal of impertinent stir about this Scripture, yet they grant this to be the natural meaning of it; which you may more clearly discern, if you consider the chief scope of this Book; wherein the Preacher's intent is, to shew the extraordinary vanity of all earthly Contentments, *ver.* 2. the utter unprofitableness of all a Man's Labours, *ver.* 3. And this he illustrates, by the shortness and uncertainty of his Life; in which respect, he is below many of his fellow Creatures, as may be manifested from these four Comparisons.

1. From the Earth, which tho it seem to be but as the Sediment of the World, as the Rubbish of the Creation; yet is this better than Man in respect of his lastingness, for *one Generation passeth away, and another cometh; but the Earth*, that abideth for ever, *ver.* 4.

2. From the Sun; who, though he seem frequently to go down, yet he constantly seems to rise again, and shines with the same glory, *ver.* 5. *But Man dieth and wasteth away; yea, Man giveth up the Ghost; and where is he? He lieth down, and riseth not, till the Heavens be no more.* Job 14. 10, 12.

3. From the Wind, the common Emblem of Uncertainty; yet it is more con-

ſtant than Man, for that *knows its circuits,*
Pſ. 78. 39. *and whirleth about continually,* ver. 6. *whereas our life paſſeth away as doth the Wind, but returneth not again.*

4. From the Sea; tho it be as uncertain as the Moon, by whom 'tis governed, yet is it more durable than Man and his Happineſs. For tho the Rivers run into it, and from it, yet is it ſtill of the ſame quantity that it was at the beginning, *verſ.* 7. But Man grows worſer, as he grows older, and ſtill nearer to a decay. So that in this reſpect, he is much inferior to many other of his fellow Creatures.

From whence it is manifeſt; that this conſtancy, or ſtanding of the Earth, is not oppoſed to its local motion, but to the changing or paſſing away of divers Men in their ſeveral Generations. And therefore, thence to conclude the Earth's Immobility, were as weak and ridiculous, as if one ſhould argue
M. Carpenter's *Geog. l.* 1. *c.* 4. thus: One Miller goes, and another comes, but the Mill remains ſtill; *ergo*, the Mill hath no motion.

Or thus; one Pilat goes, and another comes, but the Ship remains ſtill; *ergo*, the Ship doth not ſtir.

* *Perplex. l.* 2. *c.* 29. * *R. Moſes* tells us, how that many of the Jews did from this place conclude, that *Solomon* thought the Earth to be Eternal, becauſe he ſaith it abideth, לעולם, for ever; and queſtionleſs, if we examine it impartially, we ſhall find that the phraſe ſeems more to favour this Abſurdity, than that

which

which our Adverſaries would collect from hence, that it is without motion.

But Mr. *Fuller* urging this Text againſt *Copernicus*, tells us; If any ſhould interpret theſe Phraſes, concerning the Earth's ſtanding ſtill, *verſ.* 4. and the Sun's motion, *verſ.* 5. in reference only to appearance and common opinion, he muſt neceſſarily alſo underſtand thoſe two other Verſes, which mention the motion of the Wind and Rivers, in the ſame ſenſe. As if he ſhould ſay, becauſe ſome things appear otherwiſe than they are, therefore every thing is otherwiſe than it appears: or, becauſe Scripture ſpeaks of ſome natural things, as they are eſteemed according to Man's falſe conceit; therefore 'tis neceſſary, that every natural thing mentioned in Scripture, muſt be interpreted in the like ſenſe: or, becauſe in one place we read of the ends of a Staff, 1 *Kings* 8. 8. and in many other places, of the ends of the Earth, and the ends of Heaven: Therefore the Earth and Heavens have as properly ends, as a Staff. 'Tis the very ſame Conſequence with that in the Objection. Becauſe in this place of *Eccleſiaſtes*, we read of the reſt of the Earth, and the motion of the Sun; therefore, theſe Phraſes muſt needs be underſtood in the ſame proper conſtruction as thoſe afterwards, where Motion was attributed to the Wind and Rivers. Which Inference you ſee is ſo weak, that the Objector need not triumph ſo much in its ſtrength as he doth.

Another proof like unto this, is taken from St. *Peter*, *Epiſt.* 2. *Cap.* 3. *v.* 5. where he ſpeaks of the Earth ſtanding out of the Water, and in the Water, γῆ συνεστῶσα; and therefore the Earth is immoveable.

I anſwer: 'Tis evident that the word here is equivalent with *fuit*: and the ſcope of the Apoſtle is, to ſhew, that God made all the Earth; both that which was above the Water, and that which was under it. So that from this expreſſion, to collect the reſt and immobility of the Earth, would be ſuch an Argument as this other. Such a Man made that part of a Mill-wheel; or a Ship, which ſtands below the Water, and that part which ſtands above the Water; therefore thoſe things are immoveable.

To ſuch vain and idle Conſequences, does the heat of Oppoſition drive our Adverſaries.

A third Argument, ſtronger than either of the former, they conceive may be collected from thoſe * Scriptures: where 'tis ſaid, *The World is eſtabliſhed, that it cannot be moved.*

* 1 Chron. 16,30. Pſal. 93. 1. *Item* 96. 10.

To which, I anſwer: Theſe places ſpeak of the World in general, and not particularly of our Earth; and therefore may as well prove the immobility of the Heavens, they being the greateſt part of the World; in compariſon to which, our Earth is but as an inſenſible Point.

If you reply, that the word in theſe places is to be underſtood by a *Synechdoche*, as being

being meant only of this habitable World, the Earth.

I anſwer: Firſt, This is only ſaid, not proved. Secondly, *David*, but a little before, ſeems to make a difference between the World and the Earth, *Pſal.* 90. 2. where he ſays, *Before thou hadſt formed the Earth and the World.* But, thirdly, in another place, there is the ſame original word applied expreſly to the Heavens; and which is yet more, the ſame place does likewiſe mention this ſuppoſed ſetledneſs of the Earth; Prov. 3. 19. *The Lord by Wiſdom hath founded the Earth: and by Underſtanding, hath he eſtabliſhed the Heavens.* So that theſe places can no more prove an immobility in the Earth than in the Heavens.

If you yet reply, That by the Heavens there, is meant the Seat of the Bleſſed, which does not move with the reſt.

I anſwer: Tho by ſuch an evaſion, a Man might poſſibly avoid the force of this place: yet, firſt, 'tis but a groundleſs ſhift: becauſe then, that Verſe will not contain a full enumeration of the parts in the World, as may ſeem more agreeable to the intention of it; but only ſhew, that God created this Earth where we live, and the Heaven of Heavens. So that the Heaven of the Stars and Planets, ſhall be ſhifted out from the number of the other Creatures. Secondly, There is another place which cannot be ſo avoided, *Pſal.* 89. 37. where the Pſalmiſt uſes this expreſſion, כּוֹן, *It ſhall be eſtabliſhed as the*

Moon. So *Pſalm.* 8. 3. *The Moon and the Stars,* אשר כוננתה, *which* [*thou haſt eſtabliſhed.*] Thus likewiſe, *Prov.* 8. 27. *when he eſtabliſhed the Heavens*: And in the next Verſe, our Engliſh Tranſlation reads it, *when he eſtabliſhed the Clouds.* And yet our Adverſaries will affirm the Moon, and Stars, and Clouds, to be ſubject unto natural Motions: Why then ſhould the very ſame expreſſions be counted as ſufficient Arguments to take it away from the Earth?

If it be replied; That by eſtabliſhing the Heavens, is meant only the holding of them up, that they do not fall down to us, (as *Lorinus* explains that in *Pſal.* 8. and quotes *Euthymius* for the ſame interpretation) *Fundandi verbum ſignificat decidere non poſſe, aut dimoveri a loco ubi collocata ſunt.* I anſwer, Why may not we as well interpret the words thus of the Earth; ſo that by eſtabliſhing of it, is meant only the keeping of it up in the vaſt places of the open Air, without falling to any other place.

Lorinus Comment. in Pſ. 8.

From hence it is plain, That theſe Scriptures are to be underſtood of ſuch an immobility in the Earth, as may likewiſe agree with the Heavens: the ſame original word being ſo promiſcuouſly applied to both.

I, but (you will ſay) there are ſome other places which do more peculiarly apply this ſetledneſs and eſtabliſhment to the Earth. So *Pſal.* 119. 9. *Thy Faithfulneſs is unto all Generations: Thou haſt eſtabliſhed the Earth, and*

and it abideth. Thus likewiſe, *Pſal.* 104, 5. *Who laid the Foundations of the Earth, that it ſhould not be removed for ever.* The latter of which, being well weighed in its Original, (ſaith Mr. *Fuller*) does in three emphatical words, ſtrongly conclude the Earth's immobility. *Miſcel l.* 1. *c.* 15.

As firſt, when he ſays, יסד *fundavit*, he hath founded it: wherein it is implied, that it does not change its place. To which may be added all thoſe Texts, which ſo frequently ſpeak of *the Foundations of the Earth*; as alſo that expreſſion of the *Pſalmiſt*, where he mentions *the Pillars of the Earth*, Pſalm. 75. 3.

The ſecond word is (מכוניה) tranſlated *Baſis*; and by the *Septuagint*, ὅτι τὸν ἀσφάλειαν ἀυτῆς; that is, he hath founded it upon its own firmneſs; and therefore it is altogether without motion.

The third expreſſion is בל־תמוט, from the Root, מוט, which ſignifies *declinare*; implying, that it could not wag with the leaſt kind of declination.

To theſe I anſwer ſeverally:

Firſt, For the word, יסד *fundavit*, It cannot be underſtood properly, as if the natutural Frame of the Earth, like other artificial Buildings, did need any bottom to uphold it; for *he hangeth the Earth upon nothing*, Job 26. 7. But it is a *Metaphor*, and ſignifies God's placing or ſcituating this Globe of Land and Water. As *David* tells us of *the Pillars of the Earth*: ſo *Job* mentions

tions *Pillars of the Heavens*, Job 26. 11. and yet that will not prove them to be immovable.

True indeed, we read often concerning the Foundations of the Earth: but so we do likewise of the Ends, Sides, and Corners of the Earth; and yet these Scriptures will not prove it to be of a long or square form. Besides, we read also of the Foundations of Heaven, מוסדות השמים, 2 *Sam.* 22. 8. And yet we must not hence infer, that they are without all motion; As also of the *planting of the Heavens*, Isa. 51. 6. which may as well prove them to be immovable, as that which follows in the same Verse concerning the Foundations of the Earth.

Which phrase (if I have observed right) in several places of Scripture, is to be understood, according to these three Interpretations.

1. It is taken sometimes for the lower parts of the Earth, as appears by that place 2 Sam. 22. 16. *The Channels of the Sea appeared*; *the Foundations of the World were discovered.*

So Psal. 18. 15.

2. Sometimes for the beginning and first creation of it, *Isa.* 40. 21. *Hath it not been told you from the beginning? have ye not understood from the Foundations of the Earth?* And in many other places, *Before the Foundation of the World was laid*; that is, before the first Creation.

Joh. 17. 24 Ephes. 1. 4.

Sometimes it signifies the Magistrates and chief Governors of the Earth. So many in-

interpret that place in *Micah* 6. 2. where 'tis ſaid, *Hear, O ye Mountains, the Lord's Controverſy, and ye ſtrong Foundations of the Earth.* So *Pſal.* 82. 5. *The Foundations of the Earth are out of courſe:* And in 1 *Sam.* 2. 8. they are called Pillars; *For the Pillars of the Earth are the Lords, and he hath ſet the World upon them.* Hence it is, that the Hebrews derive their word for Maſter, or Lord; from a Root which ſignifies a *Baſis*, or Bottom, אדון *ab* אדן. And the Greek word for King, does, in its Primitives, import as much as the Foundation of the People, βάσις, *quaſi* βάσις τῆς λαοῦ. But now, none of all the ſeveral interpretations of this phraſe, will in the leaſt manner conduce to the confirmation of the preſent Argument. *Etymol. mag.*

As for the ſecond word, מכונתו, *Baſis ejus.* I anſwer, The proper ſignification of it, is, *locus diſpoſitus, ſedes*, or *ſtatio*, an appointed Seat or Station; and according to this ſenſe, is it moſt frequently uſed in Scripture. And therefore, the Heavens are ſometimes called, מכון, the Seat of God's Habitation. And for this reaſon likewiſe, do *Aquila* and *Symmachus* traſlate it by the word ἕδρᾳ, a Seat, or appointed ſcituation, which may as well be attributed to the Heavens.

The third expreſſion is בל-ימוט, that it ſhould not be moved from the Primitive מוט, which does not ſignify barely to move, but

but *declinare*, or *vacillare*, to decline or slip aside from its natural course. Thus it is used by *David*, Psal. 17. 5. where he prays, *Hold up my goings in thy Paths*, בל־נמטן פעמי, *that my Foot-stops slide not.* He does not mean that his feet should not move. So *Psal.* 121. 3. *He will not suffer thy foot to be moved.* Thus likewise, *Psal.* 16. 8. *Because the Lord is at my right hand, I shall not be moved:* which last place is translated in the
Act. 2. 25. New Testament, by the Greek word σαλεύω, which signifies *fluctuare*, or *vacillare*, to be shaken by such an uncertain motion, as the Waves of the Sea. Now, as *David*'s feet may have their usual motion, and yet in this sense be said not to move, that is, not to decline or slip aside: so neither can the same phrase, applied to the Earth, prove it to be immovable.

Comment. in Job. Nor do I see any reason, why that of *Didacus Astunica*, may not be truly affirmed, That we may prove the natural motion of the Earth, from that place in *Job* 6. 9. *Qui commovet terram è loco suo*, as well as its rest and immobility from these.

From all which, it is very evident, that each of these expressions, concerning the founding or establishing both of Heaven or Earth, were not intended to shew the unmovableness of either, but rather, to manifest the Power and Wisdom of Providence, who had so setled these parts of the World

World in their proper ſituations, that no natural cauſe could diſplace them, or make them decline from their appointed courſe. As for ſuch who do utterly diſlike all new interpretation of Scripture, even in ſuch matters as do meerly concern Opinion, and are not fundamental: I would only propoſe unto them a ſpeech of S. *Hierome*, concerning ſome that were of the ſame mind in his time; *Cum novas ſemper expetant voluptates, & gula eorum vicina Maria non ſufficiant, cur in ſolo ſtudio Scripturarum, veteri ſapore contenti ſunt?*

Thus have I in ſome meaſure cleared the chief Arguments from Scripture, againſt this Opinion. For which notwithſtanding, I have not thence cited any; becauſe I conceive the Holy Writ, being chiefly intended to inform us of ſuch things as concern our Faith and Obedience: we cannot thence take any proper proof for the confirmation of Natural Secrets.

PROP.

PROP. VI.

That there is not any Argument from the Words of Scripture, Principles of Nature, or Observations in Astronomy, which can sufficiently evidence the Earth to be in the Centre of the Universe.

OUr Adversaries do much insult in the strength of those Arguments which they conceive, do unanswerably conclude, the Earth to be in the Centre of the World. Whereas, if they were but impartially considered, they would be found altogether insufficient for any such conclusion, as shall be clearly manifested in this following Chapter.

The Arguments which they urge in the proof of this, are of three sorts; Either such as are taken,

1. From expressions of Scripture.
2. From Principles of Natural Philosophy.
3. From common appearances in Astronomy.

Those of the first kind, are chiefly two: The first is grounded on that common Scripture-phrase, which speaks of the Sun as being above us. So *Solomon* often mentioning humane

humane Affairs, calls them, *the VVorks which are done under the Sun.* From whence it appears, that the Earth is below it; and therefore nearer to the Centre of the *Universe* than the Sun. Eccles. 1. 14, &c.

I answer: Though the Sun, in comparison to the absolute Frame of the World, be in the midst; yet this does not hinder, but that in respect to our Earth, he may be truly said to be above it, because we usually measure the height or lowness of any thing, by its being further off, or nearer unto this Centre of our Earth. From which, since the Sun is so remote, it may properly be affirmed, that we are under it; though notwithstanding that be in the Centre of the World.

A second Argument of the same kind, is urged by *Fromondus.*

'Tis requisite, that Hell (which is in the Centre of the Earth) should be most remotely scituated from the Seat of the Blessed. But now this Heaven, which is the Seat of the Blessed, is concentrical to the starry Sphere. And therefore it will follow, that our Earth must be in the midst of this Sphere; and so consequently in the Centre of the World. *Antar. c. 12. item Vest. tract. 5. c. 2.*

I answer: This Argument is grounded upon these uncertainties;

1. That Hell must needs be scituated in the Centre of our Earth.

2. That the Heaven of the Blessed, must needs be concentrical to that of the Stars.

3. That

3. That places muſt be as far diſtant in ſcituation, as in uſe:

Which becauſe they are taken for granted, without any proof, and are in themſelves but weak and doubtful: therefore the concluſion (which always follows the worſer part) cannot be ſtrong, and ſo will not need any other anſwer.

The ſecond ſort of Arguments taken from natural Philoſophy, are principally theſe three:

Arg. 1. From the vileneſs of our Earth, becauſe it conſiſts of a more ſordid and baſe Matter than any other part of the World; and therefore, muſt be ſituated in the Centre, which is the worſt place, and at the greateſt diſtance from thoſe purer incorruptible Bodies, the Heavens.

I anſwer: This Argument does ſuppoſe ſuch Propoſitions for Grounds, which are not yet proved; and therefore not to be granted. As,

1. That Bodies muſt be as far diſtant in Place, as in Nobility.

2. That the Earth is a more ignoble Subſtance than any of the other Planets, conſiſting of a more baſe and vile Matter.

3. That the Centre is the worſt place.

All which, are, if not evidently falſe, yet very uncertain.

Arg. 2. From the nature of the Centre, which is the place of Reſt, and ſuch as in all circular Motions, is it ſelf immovable; And therefore will be the fitteſt ſcituation for

for the Earth; which by reason of its heavineſs, is naturally unfit for motion.

I answer: This Argument likewiſe is grounded upon theſe two falſe Foundations: As,

1. That the whole Frame of Nature does move round, excepting only the Earth.

2. That the whole Earth, conſidered as whole, and in its proper place, is heavy, or more unfit for a natural motion than any of the other Planets.

Which are ſo far from being ſuch general Grounds, from which Controverſies ſhould be diſcuſſed, That they are the very thing in queſtion betwixt us and our Adverſaries.

Arg. 3. From the nature of all heavy Bodies, which are to fall towards the loweſt place. From whence they conclude, that our Earth muſt be in the Centre.

I anſwer: This may prove it to be a Centre of Gravity, but not of Diſtance; or that it is in the midſt of the World. Yea, (but ſays our Adverſaries) *Ariſtotle* for this urges a Demonſtration, which muſt needs be infallible. Thus, the motion of light Bodies, does apparently tend upward towards the Circumference of the World; but now the motion of heavy Bodies, is directly contrary to the aſcent of the other; wherefore it will neceſſarily follow, that theſe do all of them tend unto the Centre of the World.

I answer: Though *Aristotle* were a Master in the Art of *Syllogisms*, and he from whom he received the Rules of Disputation; yet in this particular, 'tis very plain that he was deceived with a Fallacy, whilst his Argument does but only suppose that which it pretend to prove.

That light Bodies do ascend unto some Circumference which is higher and above the Earth, is plain and undeniable. But that this Circumference is the same with that of the World, or concentrical unto it, cannot be reasonably affirmed, unless he supposes the Earth to be in the Centre of the *Universe*, which is the thing to be proved.

I would fain know from what grounds our Adversaries can prove, that the descent of heavy Bodies is to the Centre, or the ascent of light Bodies, to the Circumference of the World. The utmost experience we can have in this kind, does but extend to those things that are upon our Earth, or in the Air above it. And alas, what is this unto the vast frame of the whole *Universe*, but *punctulum*, such an insensible Point, which does not bear so great a proportion to the whole, as a small Sand does unto the Earth? Wherefore it were a senseless thing, from our experience of so little a part, to pronounce any thing infallibly concerning the situation of the whole.

The

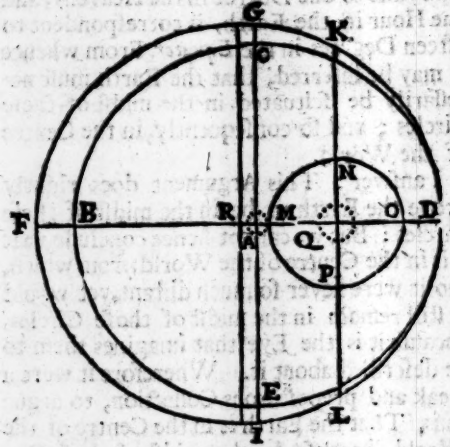
The Arguments from *Astronomy*, are chiefly these four; each of which are boasted of to be unanswerable.

Arg. 1. The *Horizon* does every where divide all the great Circles of a Sphere into two equal parts; so there is always half the Equinoctial above it, and half below. This likewise, there will constantly be six Signs of the *Zodiack* above the *Horizon*, and other six below it. And besides, the Circles of the Heaven and Earth, are each way proportionable to one another; as fifteen German miles on the Earth, are every where agreeable to one Degree in the Heavens; and one Hour in the Earth, is correspondent to fifteen Degrees in the *Equator*. From whence it may be inferred, that the Earth must necessarily be scituated in the midst of these Circles; and so consequently, in the Centre of the World.

I answer: This Argument does rightly prove the Earth to be in the midst of these Circles: But we cannot hence conclude, that it is in the Centre of the World: from which, tho it were never so much distant, yet would it still remain in the midst of those Circles, because it is the Eye that imagines them to be described about it. Wherefore it were a weak and preposterous Collection, to argue thus, That the Earth is in the Centre of the World, because in the midst of those Circles; or because the Parts and Degrees of the Earth, are answerable in proportion to the Parts and Degrees in Heaven. Whereas,

it follows rather on the contrary, That these Circles are equally distant and proportional in their parts, in respect of the Earth, because it is our Eye that describes them about the Centre of it.

So that though a far greater part of the World did appear at one time than at another; yet in respect of those Circles which our Eye describes about the Earth, all that we could see at once, would seem to be but a perfect Hemisphere: As may be manifested by this following Figure.



Where if we suppose A to be our Earth, B C D E one of the great Circles which we

we fancy about it, F G H I the Orb of fixed Stars, K the Centre of them. Now though the Arch, G F I, be bigger than the other, G H I, yet notwithstanding, to the Eye on the Earth A, one will appear a Semicircle as well as the other; because the Imagination does transfer all those Stars into the lesser Circle, B C D E, which it does fancy to be described above that Centre. Nay, though there were a habitable Earth, at a far greater distance from the Centre of the World, even in the place of *Jupiter*; to suppose at Q, yet then also would there be the same appearance. For though the Arch, K F L, in the starry Heaven, were twice as big as the other, K H L, yet notwithstanding, at the Earth Q, they would both appear but as equal Hemispheres, being transferred into that other Circle, M N O P, which is part of the Sphere that the Eye describes to it self about the Earth.

From whence we may plainly discern, That though the Earth be never so far distant from the Centre of the World, yet the Parts and Degrees of that imaginary Sphere about it, will always be proportional to the Parts and Degrees of the Earth.

Arg. 2. Another Demonstration like unto this former, frequently urged to the same purpose, is this: If the Earth be out of the Centre of the World, then must it be either in the *Equator*, but out of the *Axis*; or, *Vid. Cant. Geog. l. 1. c. 5.*

or, secondly, in the *Axis*, but out of the *Equator*; or, thirdly, besides both of them. But it is not placed according to any of these scituations, therefore must it needs be in the Centre.

1. 'Tis not in the *Equator*, and beside the *Axis*. For then, first, there will be no *Equinox* at all in some places, when the Days and Nights shall be of unequal length. Secondly, The Afternoons and Forenoons will not be of the same length; because, then our Meridian-Line must divide the *Hemisphere* into unequal parts.

2. 'Tis not in the *Axis*, but out of the *Equator*. For then, first, the *Equinox* would not happen when the Sun was in the middle Line between the two *Solstices*, but in some other Parallel, which might be nearer to one of them, according as the Earth did approach to one *Tropick* more than another. Secondly, There would not be such a proportion between the increase and decrease of Days and Nights, as now there is.

3. 'Tis not besides both of them: For then, all these Inconveniences, and sundry others, must with the same necessity of consequence be inferred. From whence it will follow, That the Earth must be scituated there, where the *Axis* and *Equator* meet, which is in the Center of the World.

To this we grant, that the Earth must needs be placed, both in the *Axis* and *Equator*; and so consequently, in the Centre of that Sphere which we imagine about it:

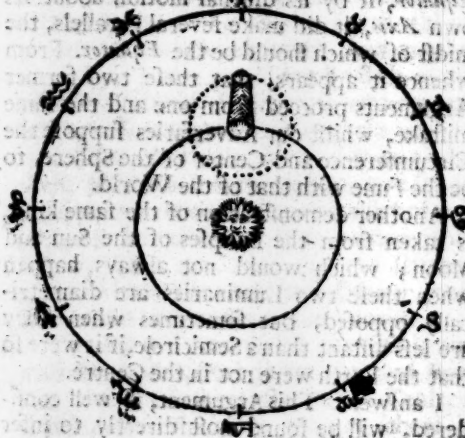
But

But yet this will not prove that it is in the midst of the *Universe*; for let our Adversaries suppose it to be as far distant from that, as they conceive the Sun to be; yet may it still be supposed in the very concourse of these two Lines: because the *Axis* of the World is nothing else but that imaginary Line which passes through the Poles of our Earth to the Poles of the World. And so likewise the *Equator*, is nothing else but a great Circle in the midst of the Earth, betwixt both the Poles, which by imagination is continued even to the fixed Stars. Thus also, we may affirm the Earth to be in the plane of the *Zodiack*, if by its annual motion it did describe that imaginary Circle: and in the plane of the *Equator*, if by its diurnal motion about its own *Axis*, it did make several Parallels, the midst of which should be the *Equator*. From whence it appears, that these two former Arguments proceed from one and the same mistake, whilst our Adversaries suppose the Circumference and Center of the Sphere, to be the same with that of the World.

Another demonstration of the same kind, is taken from the Eclipses of the Sun and Moon; which would not always happen when these two Luminaries are diametrically opposed, but sometimes when they are less distant than a Semicircle, if it were so that the Earth were not in the Centre. *Arg.* 3.

I answer: This Argument, if well considered, will be found most directly to infer

this conclusion, That in all Eclipses, the Earth is in such a streight Line, (betwixt the two Luminaries) whose extremities do point unto opposite parts of the *Zodiack*. Now tho our Adversaries should suppose (as *Copernicus* does) the Earth to be scituated in that which they would have to be the Sun's Orb; yet would there not be any Eclipse, but when the Sun and Moon were diametrically opposite, and our Earth betwixt them: As may clearly be manifested by this Figure, where you see the two Luminaries in opposite Signs; and according as any part of our Earth is scituated by its diurnal Revolution, so will every Eclipse be either visible, or not visible unto it.



Arg. 4. The laſt and chief Argument, is taken from the appearance of the Stars; which in every Horizon, at each hour of the Night, and at all times of the Year, ſeem of an equal bigneſs. Now this could not be, if our Earth were ſometimes nearer unto them by 2000000 German miles, which is granted to be the Diameter of that Orb, wherein the Earth is ſuppoſed to move. Arist. de Cœlo, l. 2. c. 14.

I anſwer: This Conſequence will not hold, if we affirm the Earth's Orb not to be big enough for the making of any ſenſible difference in the appearance of the fixed Stars. Copern. l. 1. c. 5, 6.

Yea, but (you will ſay) 'tis beyond conceit, and without all reaſon, to think the fixed Stars of ſo vaſt a diſtance from us, that our approaching nearer unto them by 2000000 German miles, cannot make any difference in the ſeeming quantity of their Bodies.

I reply: There is no certain way to find out the exact diſtance of the ſtarry Firmament: But we are fain to conclude of it by Conjectures, according as ſeveral Reaſons and Obſervations ſeem moſt likely unto the Fancies of divers Men. Now that this Opinion of *Copernicus* does not make it too big, may be diſcerned from theſe following Conſiderations.

The words, *great* and *little*, are relative tearms, and do import a compariſon to ſomething elſe: So that where the Firmament

ment (as it is according to *Copernicus*) is said to be too big; 'tis likely, that this word is to be understood in reference to some other thing of the same kind, the least of which is the Moons Orb: But now if its being so much bigger than this may be a sufficient reason, why it should be thought too great, then it seems that every thing which exceeds another of the same kind, in such a proportion, may be concluded to be of too big a quantity: and so consequently, we may affirm, that there is no such thing in the World. And hence it will follow, that Whales and Elephants are meer *Chimera*'s, and poetical Fictions, because they do much exceed many other living Creatures. If all this eighth Sphere, (saith *Galilaeus*) as great as it is, were a light Body, and placed so far from us, that it appeared but as one of the lesser Stars, we should then esteem it but little; and therefore, we have no reason now to thrust it out from being amongst the Works of Nature, by reason of its too great immensity. 'Tis a frequent speech of our Adversaries, *Tycho*, *Fromondus*, and others, in excuse of that incredible swiftness which they imagine in their *Primum Mobile*, That 'twas requisite the Motion of the Heavens should have a kind of infinity in it, the better to manifest the infiniteness of the Creator. And why may not we as well affirm this concerning the bigness of the Heavens? *Difficilius est accidens praeter modulum subjecti intendere, quam subjectum*

sine

sine accidente augere, (saith *Kepler*.) His meaning is, that 'tis less absurd to imagine the eighth Sphere of so vast a bigness, as long as 'tis without motion, or at least, has but a very slow one; than to attribute unto it such an incredible celerity, as is altogether disproportionable to its bigness.

3. 'Tis the acknowledgment of *Clavius*, and might easily be demonstrated, That if the Centre were fastned upon the Pole of the World, the Orb wherein he supposes the Sun to move, would not be able to reach so far in the eighth Sphere, (being considered according to *Ptolomy's Hypothesis*) as to touch the Pole-star: which notwithstanding, (saith he) is so near the Pole it self, that we can scarce discern it to move: Nay, that Circle which the Pole-star makes about the Pole, is above four times bigger than the Orb of the Sun. So that according to the opinion of our Adversaries, though our Earth were at that distance from the Centre, as they suppose the Sun to be, yet would not this *Excentricity* make it nearer to any one part of the Firmament, than the Pole-star is to the Pole, which according to his confession, is scarce sensible. And therefore according to their opinion, it would cause very little difference in the appearance of those Stars, the biggest of which, does not seem to be of above five Seconds in its Diameter.

Comment. in Sphar. cap. 1.

3. 'Tis

3. 'Tis considerable, That the Spheres of *Saturn*, *Jupiter*, *Mars*, are, according to the general opinion, of very great extension; and yet each of them is appointed only to carry about its particular Planet, which are but very little in comparison of the fixed Stars. Now if for the situation of these fixed Stars, there should be allotted a proportionable part of the World, 'tis certain, that their Orb must be far bigger than it is commonly supposed, and very near to this Opinion of *Copernicus*.

4. We usually judg the bigness of the higher Orbs, by their different motions. As because *Saturn* finishes his course in thirty Years, and *Jupiter* in twelve, therefore we attribute unto those Orbs, such a different proportion in their bigness. Now if by this Rule we should find out the quantity of the eighth Sphere, we shall discern it to be far nearer unto that bigness, which *Copernicus* supposeth it to have, than that which *Ptolomy*, *Tycho*, and others, ordinarily ascribe unto it. For the starry Heaven (say they) does not finish his course under 26000 Years; whereas *Saturn*, which is next unto it, does compass his Orb in thirty Years. From whence it will probably follow, that there is a very great distance betwixt these in place, because they have such different terms of their Revolutions.

But against this Answer: Unto the last Argument, our Adversaries thus reply:

1. If

1. If the fixed Stars be so far distant from us, that our approaching nearer unto them by 2000000 German miles, do not make any sensible difference in their appearance, then *Galileus* his Perspective could not make them seem of a bigger Form, than they do to the bare Eye, which yet is contrary to common experience. Fromond. *Vest math.* 5. *cap.* 2.

2. From hence it may be inferred, That the least fixed Star is bigger than all this Orb wherein we suppose the Earth to move; because there is none of them but are of a sensible bigness in respect of the Firmament; whereas this it seems is not. *Ibid.*

3. Since God did at first create the Stars *for the use of all Nations that are under the whole Heavens*, Deut. 4. 19. it might have argued some improvidence in him, if he had made them of such vast magnitudes: whereas they might as well bestow their light and influences, and so consequently be as serviceable to that end for which they were appointed, if they had been made with less Bodies, and placed nearer unto us. And 'tis a common *maxime*, that Nature in all her Operations, does avoid superfluities, and use the most compendious way. *Ibid.*

I answer:

1. To the first; whether the Perspective do make the fixed Stars appear bigger than they do to the bare Eye, cannot certainly be concluded, unless we had such an exact Glass, by which we might try the experiment. But if in this kind we will trust the

authority

authority of others, * Kepler tells us, from the experience of skilful Men, that the better the Perspective is, by so much the less will the fixed Stars appear through it, being but as meer Points from which the Beams of Light do disperse themselves like Hairs. And 'tis commonly affirmed by others, that the Dog-star, which seems to be the biggest Star amongst those of the first Magnitude, does yet appear through this Glass, but as a little Point no bigger than the fiftieth part of *Jupiter*. Hence it is, that though the common Opinion hold the Stars of the first Magnitude to be two Minutes in their Diameter, and *Tycho* three; yet † *Galileus*, who had been most versed in the Experiments of his own Perspective, concludes them to be but five Seconds.

* *Astron. Copern. l. 1. par. 2.*

† *System. mundi, Col. 3.*

2. To the second: First, we affirm the fixed Stars to be of a vast Magnitude. But however, this Argument does not induce any necessity that we should conceive them so big as the Earth's Orb. For it might easily be proved, that though a Star of the sixth Magnitude, were but equal in Diameter unto the Sun, (which is far enough from the greatness of the Earth's Orb) yet the starry Heaven would be at such a distance from us, that the Earth's annual Motion could not cause any difference in its appearance.

Vid Galil. ibid.

Suppose the Diameter of the Sun to be about half a Degree, as our Adversaries grant; whereas a Star of the fifth Magnitude

tude is fifty Thirds, which is comprehended in that of the Sun 2160 times. Now if the Sun were removed so far from us, that its Diameter would seem but as one of that number whereof it now contains 2160, then must his distance from us be 2160 times greater than now it is: which is all one, as if we should say, that a Star of the fifth Magnitude is severed from us by so many Semidiameters of the Earth's Orb. But now, according to common consent, the distance of the Earth from the Sun, does contain 28 Semidiameters of the Earth: and (as was said before) this supposed distance of the fixed Stars, does comprehend 2160 Semidiameters of the Earth's Orb, from whence it is manifest, that the Semidiameter of the Earth, in comparison to its distance from the Sun, will be almost doubly bigger than the Semidiameter of the Earth's Orb, in comparison to this distance of the Stars. But now the Semidiameter of the Earth, does make very little difference in the appearance of the Sun, because we see common Observations upon the Surface of it, are as exactly true to the sense, as if they were made from the Centre of it. Wherefore, that difference which would be made in these fixed Stars, by the annual course of the Earth, must needs be much more unobservable, or rather altogether insensible.

2. The Consequence of this Argument, is grounded upon this false supposition, That every Body must necessarily be of an equal extension,

extenſion, to that diſtance from whence there does not appear any ſenſible difference in its quantity. So that when I ſee a Bird flying ſuch a height in the Air, that my being nearer unto it, or farther from it, by ten or twenty Foot, does not make it ſeem unto my Eyes either bigger or leſs; then I may conclude, that the Bird muſt needs be either ten or twenty foot thick: Or when I ſee the Body of a Tree that may be half a mile from me, and perceive that my approaching nearer to it, by thirty or forty paces, does not ſenſibly make any different appearance; I may then infer, that the Tree is forty paces thick; with many the like abſurd Conſequences, that would follow from that Foundation upon which this Argument is bottom'd.

To the third, I anſwer: 'Tis too much preſumption, to conclude that to be ſuperfluous, the uſefulneſs of which we do not underſtand. There be many ſecret Ends in theſe great Works of Providence, which humane Wiſdom cannot reach unto; and as *Solomon* ſpeaks of thoſe things that are under the Sun, ſo may we alſo of thoſe things that are above it, *That no Man can* Eccl. 8. 17. *find out the Work of God, for though a Man labour to ſeek it out*; Yea, further, *Though a wiſe Man think to know it, yet ſhall he not be able to find it.* He that hath moſt inſight into the Works of Nature, is not able to give a ſatisfying reaſon, why the Planets or Stars ſhould be placed juſt at this particular diſtance

ſtance from the Earth, and no nearer or farther. And beſides, this Argument might as well be urged againſt the *Hypotheſis* of *Ptolomy* or *Tycho*, ſince the Stars, for ought we know, might have been as ſerviceable to us, if they had been placed far nearer than either of thoſe Authors ſuppoſe them. Again, were there any force in ſuch a Conſequence, it would as well conclude a great improvidence of Nature, in making ſuch a multitude of thoſe leſſer Stars, which have lately been diſcovered by the Perſpective. For to what purpoſe ſhould ſo many Lights be created for the uſe of Man, ſince his Eyes were not able to diſcern them? So that our diſability to comprehend all thoſe ends which might be aimed at in the Works of Nature, can be no ſufficient Argument to prove their ſuperfluity. Though Scripture tells us, that theſe things were made for our uſe, yet it does not tell us, that this is their only end. 'Tis not impoſſible, but that there may be elſewhere ſome other Inhabitants, by whom theſe leſſer Stars may be more plainly diſcerned. And (as was ſaid before) why may not we affirm that of the bigneſs, which our Adverſaries do concerning the motion of the Heavens? That God, to ſhew his own immenſity, did put a kind of infinity in the Creature.

There is yet another Argument to this purpoſe, urged by * *Al. Roſſ.* which was not referred to any of the former kind, becauſe I could ſcarcely believe I did rightly under-

* *Lib. 1. ſect. 2. c. 1.*

ſtand it: ſince he puts it in the front of his other Arguments, as being of ſtrength and ſubtilty enough to be a Leader unto all the reſt; and yet in the moſt likely ſenſe of it, 'tis ſo extreamly ſimple to be preſſed in a Controverſy, that every freſh Man would laugh at it. The words of it are theſe: *Quod minimum eſt in circulo debet eſſe centrum illius, at Terra longè minor eſt Sole, & Æquinoctialis Terreſtris eſt omnium in Cœlo circulus minimus, ergo*, &c.

By the ſame reaſon, it would rather follow, that the *Moon*, or *Mercury*, were in the Centre, ſince both theſe are leſs than the Earth. And then, whereas he ſays, that the Equinoctial of the Earth, is the leaſt Circle in the Heavens, 'tis neither true nor pertinent, and would make one ſuſpect, that he who ſhould urge ſuch an Argument, did ſcarce underſtand any thing in Aſtronomy.

There are many other Objections like unto this, not worth the citing: The chief of all have been already anſwered; by which you may diſcern, that there is not any ſuch great neceſſity, as our Adverſaries pretend, why the Earth ſhould be ſcituated in the midſt of the *Univerſe*.

PROP.

PROP. VII.

'Tis probable that the Sun is in the Centre of the World.

THE chief Reasons for the confirmation of this Truth, are implied in the conveniences of this *Hypothesis* above any other; whereby we may resolve the Motions and Appearances of the Heavens, into more easy and natural Causes.

Hence will the Frame of Nature be freed from that deformity, which it has according to the *Systeme* of *Tycho*: who though he make the Sun to be in the midst of the Planets, yet, without any good Reason, denies it to be in the midst of the fixed Stars; as if the Planets, which are such eminent parts of the World, should be appointed to move about a distinct Centre of their own, which was beside that of the *Universe*.

Hence likewise are we freed from many of those Inconveniences in the *Hypothesis* of *Ptolomy*, who supposed in the Heavens, *Epicycles* and *Eccentricks*, and other Orbs, which he calls the Deferents of the *Apoge* and the *Perige*. As if Nature, in framing this great Engine of the World, had been put unto such hard shifts, that she was fain to make use of Wheels and Screws, and other

the like Artificial Inſtruments of Motion.

There be ſundry other Particulars, whereby this Opinion concerning the Sun's being in the Centre, may be ſtrongly evidenced; Which becauſe they relate unto ſeveral Motions alſo, cannot therefore properly be inſiſted on in this place. You may eaſily enough diſcern them, by conſidering the whole Frame of the Heavens, as they are according to the *Syſteme* of *Copernicus*; wherein all thoſe probable Reſolutions that are given for divers appearances amongſt the Planets, do mainly depend upon this Suppoſition, that the Sun is in the Centre. Which Arguments (were there no other) might be abundantly enough for the confirmation of it. But for the greater plenty, there are likewiſe theſe Probabilities conſiderable.

1. It may ſeem agreeable to reaſon, That the Light which is diffuſed in ſeveral Stars through the Circumference of the World, ſhould be more eminently contained, and (as it were) contracted in the Centre of it, which can only be by placing the Sun there.

* *In prim. cap. Spher.*

2. 'Tis an Argument of * *Clavius*, and frequently urged by our Adverſaries, That the moſt natural ſcituation of the Sun's Body was in the midſt, betwixt the other Planets; and that for this Reaſon, becauſe from thence he might more conveniently diſtribute amongſt them both his Light and Heat.

Heat. The force of which, may more properly be applied to prove him in the Centre.

3. 'Tis probable that the Planetary Orbs (which are ſpecial parts of the *Univerſe*) do move about the Centre of the World, rather than about any other Centre which is remote from it. But now 'tis evident, that the Planets *Saturn*, *Jupiter*, *Mars*, *Venus*, *Mercury*, do, by their Motion, encompaſs the Body of the Sun. 'Tis likely therefore that this is ſcituated in the midſt of the World.

And as for the three upper Planets, 'tis found, by Obſervation, that they are always neareſt to the Earth, when in oppoſition to the Sun, and fartheſt from us, when in conjunction with it: Which difference is ſo eminent, that *Mars* in his *Perige* does appear ſixty times bigger, than when he is in the *Apoge*, and at the greateſt diſtance.

Now, that the Revolution of *Venus* and *Mercury* alſo is about the Sun, may from hence be evidenced. Firſt, Becauſe they are never at any great diſtance from him. Secondly, Becauſe they are ſeen ſometimes above, and ſometimes below him. Thirdly, Becauſe *Venus*, according to her different ſcituations, does change her appearance as the Moon.

4. There is yet another Argument, which * *Ariſtotle* himſelf doth repeat from *Pythagorai*. The moſt excellent Body ſhould have the beſt place: but the Sun is the moſt excellent

* *De Cœlo, l. 2. c. 13.*

cellent Body, and the Centre is the beſt place; therefore 'tis likely the Sun is in the Centre. In the Frame of Nature (which is ſuppoſed to be of an orbicular Form) there are but two places of any eminency, the Circumference and the Centre. The Circumference being of ſo wide a capacity, cannot ſo fitly be the peculiar Seat of a Body, that is ſo little in reſpect of it: And beſides, that which is the moſt excellent part of the World, ſhould be equally preſerved in it ſelf, and ſhared in its Vertues by all the other parts, which can only be done, by its being placed in the midſt of them. This is intimated unto us, in that frequent Speech of *Plato*, that the Soul of the World does reſide in the innermoſt place of it: And that in * *Macrobius*, who often compares the Sun in the World, to the Heart in a living Creature.

* *Saturnal. lib.* 1. *c.*17, &c.

Unto this *Ariſtotle* anſwers by a diſtinction: There is *medium magnitudinis*, ſo the Centre is in the middle of the Sphere: And there is *medium naturæ*, or *perfectionis*, which is not always the ſame with the other; for in this ſenſe the Heart is in the middle of a Man; becauſe from thence (ſaith he) as from the Centre, the vital Spirits are conveyed to all the Members: and yet we know that it is not the Centre of Magnitude, or at an equal diſtance from all the other parts.

And beſides, the middle is the worſt place, becauſe moſt circumſcribed, ſince that is more

more excellent, which does limit any thing, than that which is bounded by it. For this reason is it, that Matter is amongst those things which are terminated, and Form that which does circumscribe.

But against this answer of *Aristotle*, it is again replied:

1. Though it be true, that in living Creatures, the best and chiefest part is not placed always just in the midst; yet this may be, because they are not of an orbicular Form, as the World is. Keplar. *astr.* Copern. *lib.* 2. *par.* 2.

2. Though that which bounds another thing, be more excellent than that which is terminated by it, yet this does not prove the Centre to be the worst place, because that is one of the Terms or Limits of a round Body, as well as the Circumference.

There are likewise other Arguments to this purpose, much insisted on by eminent Astronomers; taken from that Harmonical Proportion which there may be betwixt the several distances and bigness of the Orbs, if we suppose the Sun to be in the Centre. Massin. *pra. ad Narrat. Rhetici.* Keplar. *mysterium Cosmographicum.*

For according to this (say they) we may conceive an excellent harmony, both in the number and the distance of the Planets; (and if God made all other things, *numero & mensurâ*, much more then those greater Works, the Heavens) for then the five Mathematical Bodies, so much spoken of by * *Euclid*, will bear in them a proportion * *Lib.* 13. *prop.* 14, 15, &c.

answerable to the several distances of the Planets from one another.

Thus a *Cube* will measure the distance betwixt *Saturn* and *Jupiter*; a *Pyramis* or *Tetraëdron*, the distance betwixt *Jupiter* and *Mars*; a *Dodecaëdron*, the distance betwixt *Mars* and the *Earth*; an *Icosaëdron*, the distance betwixt the *Earth* & *Venus*; and an *Octoëdron*, the distance betwixt *Venus* & *Mercury*: that is, if we conceive a Circumference described immediately without the *Cube*, and another within it, the distance between these two, will shew what proportional distance there is betwixt the Orb of *Saturn*, and that of *Jupiter*. Thus also, if you conceive a Circumference described on the outside of a *Pyramis*, or *Tetraëdron*, and another within it, this will shew such a proportional distance, as there is betwixt the Orb of *Mars*, from that of *Jupiter*. And so of the rest.

Now if any ask why there are but six Planetary Orbs? *Keplar* answers, *Quia non oportet plures quàm quinque proportiones esse, totidem nempè quot regularia sunt in Matheseos corpora. Sex autem termini consummant hunc proportionum numerum*: Because there are but five proportions, so many as there are regular Bodies in Mathematicks, each of whose Sides and Angles are equal one to another. But now there are six terms required to consummate this number of proportions; and so consequently, there can be but six primary Planets.

Thus

Thus likewiſe, by placing the Sun in the Centre, we may conceive ſuch a proportion betwixt the Bodies of the Planets, as will be anſwerable unto their ſeveral Spheres: Then *Mercury*, which has the leaſt Orb, will have the leaſt Body; *Venus* bigger than that, but leſs than any of the other; our *Earth* bigger than *Venus*, but leſs than the reſt; *Mars* bigger than the *Earth*, but leſs than *Jupiter*; *Jupiter* bigger than *Mars*, and leſs than *Saturn*; *Saturn* being the higheſt, ſhould alſo be the biggeſt. All which Harmony would be diſturbed, by putting in the Sun amongſt them; and therefore, it may be more convenient for him to ſit ſtill in the Centre.

There are ſundry other Arguments in this kind to be found out, by a conſideration of this whole *Hypotheſis*: He that does rightly underſtand it, may therein eaſily diſcern many ſtrong Probabilities, why the Sun ſhould be in the midſt of the World, rather than in any other Poſition.

PROP.

PROP. VIII.

That there is not any sufficient reason to prove the Earth incapable of those motions which Copernicus *ascribes unto it.*

THE two chief Motions in the World, which are more especially remarkable above the rest, are the *Diurnal*, and *Annual*.

The *Diurnal*, which makes the difference betwixt Night and Day, is caused by the Revolution of our Earth upon its own *Axis*, in the space of four and twenty hours.

The *Annual*, which makes the difference betwixt Winter and Summer, is likewise caused by the Earth, when being carried through the *Ecliptick* in its own Orb, it finishes its course in a Year.

The first is usually stiled, *Motus Revolutionis:* The second, *Motus Circumlationis:* There is likewise a third, which *Copernicus* calls, *Motus Inclinationis:* But this being throughly considered, cannot properly be stiled a Motion, but rather an Immutability, it being that whereby the *Axis* of the Earth does always keep parallel to it self; from which scituation, it is not its Annual Course that does make it in the least manner to decline.

As

As for the Difficulties which concern the ſecond of theſe, they have been already handled in the ſixth Propoſition, where the Earth's *Excentricity* was maintained.

So that the chief buſineſs of this Chapter, is to defend the Earth's Diurnal Motion, againſt the Objections of our Adverſaries. Sundry of which Objections, to ſpeak (as the Truth is) do bear in them a great ſhew of probability, and ſuch too (as it ſeems) was very efficacious, ſince *Ariſtotle* and *Ptolomy*, &c. Men of excellent Parts, and deep Judgments, did ground upon them, as being of infallible and neceſſary conſequence.

I ſhall reckon them up ſeverally, and ſet down ſuch Anſwers unto each, as may yield ſome ſatisfaction to every indifferent ſeeker of Truth.

Firſt then, 'tis objected from our ſenſes; If the Earth did move, we ſhould perceive it. The Weſtern Mountains would then appear to aſcend towards the Stars, rather than the Stars to deſcend below them.

I anſwer: The ſight judges of Motion, according as any thing does deſert the Plane whereon it ſelf is ſeated: which Plane every where keeping the ſame ſituation and diſtance, in reſpect of the Eye, does therefore ſeem immovable unto it, and the motion will appear in thoſe Stars and parts of the Heaven, through which the Vertical Line does paſs.

The

The reason of such deceit may be this: Motion being not a proper Object of the Sight, nor belonging to any other peculiar Sense, must therefore be judged of by the *sensus communis*, which is liable to mistake in this respect; because it apprehends the Eye it self to rest immovable, whilst it does not feel any Effects of this Motion in the Body: As it is when a Man is carried in a Ship; so that Sense is but an ill Judg of Natural Secrets. 'Tis a good Rule of *Plato*, Εἰς τὰ νῦν ἀφορᾶν δεῖ φιλόσοφον καὶ μὴ εἰς τὸ δόξαν: A Philosopher must not be carried away by the bare appearance of things to sight, but must examine them by reason. If this were a good Consequence, The Earth does not move, because it does not appear so to us; we might then as well argue, that it does move when we go upon the Water, according to the Verse:

Provehimur portu, terraque, urbesque recedunt.

Or if such Arguments would hold, it were an easy matter to prove the Sun and Moon not so big as a Hat, or the fixed Stars as a Candle.

Al. Ross. l. 1. sect. 1. cap. 1.

Yea, but if the Motions of the Heavens be only apparent, and not real, then the Motion of the Clouds will be so too, since the Eye may be as well deceived in the one as the other.

I answer: 'Tis all one, as if he should infer, that the sense was mistaken in every thing,

thing, becauſe it was ſo in one thing: And this would be an excellent Argument to prove that Opinion of *Anaxagoras*, that the Snow was black.

The reaſon why that motion which is cauſed by the Earth, does appear as if it were in the Heavens, is, becauſe the *ſenſus communis*, in judging of it, does conceive the Eye to be it ſelf immovable, (as was ſaid before) there being no ſenſe that does diſcern the effects of any motion in the Body; and therefore, it does conclude every thing to move, which it does perceive to change its diſtance from it: So that the Clouds do not ſeem to move ſometimes, when as notwithſtanding they are every where carried about with our Earth, by ſuch a ſwift revolution; yet this can be no hindrance at all, why we may not judg aright of their other particular Motions, for which there is not the ſame reaſon. Though to a Man in a Ship, the Trees and Banks may ſeem to move; yet it would be but a weak Argument, to conclude from thence, that therefore ſuch a one could not tell whether his Friend does really ſtir, whom he ſees to walk up and down in the Ship: or that he might as well be deceived in judging the Oars to move, when they do not.

'Tis again replied by the ſame Objector, That it is not credible, the Eye ſhould be miſtaken in judging of the Stars and Heavens; becauſe thoſe being light Bodies, are the primary & proper Objects of that Senſe.

I anſwer: The deceit here, is not concerning the Light or Colour of thoſe Bodies, but concerning their Motion; which is neither the primary nor proper Object of the Eye, but reckoned amongſt the *Objecta Communia.*

2. Another common Argument againſt this Motion, is taken from the danger that would thence ariſe unto all high Buildings, which by this would quickly be ruinated and ſcattered abroad.

I anſwer: This Motion is ſuppoſed to be natural; and thoſe things which are according to Nature, have contrary effects to other matters, which are by force and violence. Now it belongs unto things of this latter kind, to be inconſtant and hurtful; whereas thoſe of the firſt kind muſt be regular, and tending to conſervation. The Motion of the Earth, is always equal and like it ſelf; not by ſtarts and fits. If a Glaſs of Beer may ſtand firmly enough in a Ship, when it moves ſwiftly upon a ſmooth ſtream; much leſs then will the Motion of the Earth, which is more natural, and ſo conſequently more equal, cauſe any danger unto thoſe Buildings that are erected upon it. And therefore to ſuſpect any ſuch event, would be like the fear of *Lactantius*, who would not acknowledg the being of any *Antipodes*, leſt then he might be forced to grant that they ſhould fall down unto the Heavens. We have equal reaſon to be afraid of high Buildings, if the whole World above

Gilbert. *de Magn. l. 6. c. 5.*

above us were whirled about with such a mad celerity as our Adversaries suppose; for then there would be but small hopes that this little point of Earth should escape from the rest.

But supposing (saith * *Rosse*) that this Motion were natural to the Earth, yet it is not natural to Towns and Buildings, for these are Artificial. *Lib. 1. sect. 1. cap. 3.*

To which I answer: Ha, ha, ha.

3. Another Argument to this purpose, is taken from the rest and quietness of the Air about us; which could not be, if there were any such swift Motion of the Earth. If a Man riding upon a fleet Horse, do perceive the Air to beat against his Face, as if there were a Wind, what a vehement Tempest should we continually feel from the East, if the Earth were turned about with such a swift revolution as is supposed?

Unto this 'tis usually answered, That the Air also is carried along with the same motion of the Earth: For if the Concavity of the Moon's Orb, which is of so smooth and glabrous a Superficies, may (according to our Adversaries) drive along with it the greatest part of this Elementary World, all the Regions of Fire, and all the vast upper Regions of Air, and (as some will have it) the two lower Regions, together with the Sea likewise; for from hence (saith *Alex. Rosse, lib. 1. sect. 1. cap. 3.*) is it, that betwixt the *Tropicks* there is a constant Eastern Wind, and a continual flowing of the Sea West-

Westward: I say, if the Motion of the Heavens, which are smooth Bodies, may be able to carry with it so great a part of the Elementary World: or if the rugged parts of the Moon's Body, be able to carry with it so great a part of the Air, as *Fromondus* (*Ant. c.* 16.) affirms; much more then may our Earth, which is a rugged mountanous Body, be able to turn about so little a part of the World, as that vaporous Air next unto it.

Suppose the inward Circle to represent the Earth; and the outward, the thicker Air which encompasses it. Now it is easily conceivable, that the revolution of so great a Body as this Globe of Earth, may turn about

about by its meer motion, (if there were nothing else) so little a part of the adjoining Air, as is here represented. And yet,

1. The disproportion betwixt the thickness of the Earth, and this Orb of Air, is far greater than could be expresst in the Figure, being but as twenty miles, which is at most the thickness of this Air, unto 3456 miles, which is the Semidiameter of our Earth, and so is but as an insensible number in respect of this other.

2. Besides the meer motion of the Earth, which in probability (being such a rugged Body) might be enough to carry so little a part of the Air along with it; there is also (as we suppose) a magnetical vigour which proceeds from it, whereby 'tis more able to make all things that are near unto it, to observe the same Revolution.

But if it be so (saith * *Alex. Ross.*) that not only the Man, but the *Medium* also, and the Object be moved, this must needs be such a great hindrance to the sight, that the Eye cannot judg exactly of any thing. For suppose the Man alone to be in a motion, he could not see so well as when he is still; but now, if not only he, but his Spectacles, and Book, were all moved, he would not be able to discern any thing distinctly.

* *Lib.* 1. *sect.* 1. *c.* 5.

I answer: The Consequence were pertinent, if all these were several motions: but if the Subject, and *Medium*, and Object, were all carried with one and the same equal motion, (as it is here supposed) this could

be no impediment to the Act of seeing, but it would be all one with the rest; because by this means, they are not severed from one another; and therefore the *species* are not disturbed. 'Tis an excellent saying of * *Galileus*, and may serve for the resolution of many such Doubts as these; *Motus eatenus tanquàm motus operatur, quatenus relationem habet ad res quæ ipso destituuntur; in iis verò rebus, quæ toti æqualiter & ea participant, nihil operatur, & ita se habet ac si nullus esset.* If a Man be within some Room of a Ship, he may read altogether as easily when the Ship moves, as when it stands still.

* *Syst. mundi, Colloq. 2.*

4. Another Argument against this circular motion of the Earth, is grounded upon that common Principle amongst the *Aristotelians*; *Unius corporis simplicis unus tantùm est motus*: One kind of Body, has but one kind of Motion. But now, the Earth and Water hath a motion of descent: the Air, a motion of ascent; and therefore none of them can have any circular motion natural unto them.

I answer: First, These right Motions of Elementary Bodies, belong only to the parts of them, and that too when they are out of their proper places; so that the whole to which they belong, may, notwithstanding this, have another Motion of its own. But, secondly, this saying which *Aristotle* calls a Principle, will not consist with other evident Experiments of Nature. Thus, though

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a Loadstone, in respect of its matter and condensity, naturally tends downward; yet this does not hinder, but that in respect of some other qualities, as its desire of union and coition to another Loadstone, it may also naturally move upwards. From whence it will follow, that the same Elementary Body, may have divers natural Motions.

5. The gravity and magnitude of this Earthy Globe, do make it altogether unfit for so swift a Motion.

I answer: First, Heavinesse can only be applied unto those Bodies which are out of their proper places, or unto such parts as are severed from the whole to which they belong. And therefore the Globe of Earth, considered as whole, and in its right place, cannot truly be called heavy. I deny not, but that there is in it, and so likewise in the other Planets, an ineptitude to motion, by reason of the matter and condensity of their Bodies: And so likewise there is, as truly, (though not according to the same degrees) in the least particle of a material condensed Substance: so that this cannot reasonably be pretended as a just Impediment, why the Earth should be incapable of such a Motion. Secondly, And though this Globe be of so vast a magnitude, yet, as Nature bestows upon other Creatures (for instance, an Eagle and a Fly) Spirits, and motive Powers, proportionable to their several Bodies: so likewise may she endow

the Earth with a motive Faculty answerable to its greatness. Or if this may make the Earth incapable of so swift a motion as is supposed, much more then will the Heavens be disabled for that greater swiftness which is imagined in them. I might add, the Globe of the Sun, and *Jupiter*, are observed to move about their own Centres; and therefore the Earth, which is far less than either of them, is not, by reason of its too great magnitude, made unfit for such a Revolution. Thirdly, As for the swiftness of the Earth's Course, it does not exceed (all Circumstances well considered) the celerity of some other Motions, with which we are acquainted; as that of the Clouds, when driven by a tempestuous Wind; that of a Bullet shot from a Canon, which in the space of a minute flies four miles. Or, as another hath observed, in the second scruple of an hour, it may pass the fifteenth part of a German mile: Than which, there is not any Point in the Earth's Equinoctial that moves faster; and though a Bullet be much slower in moving a greater distance, yet for so little a space, while the force of the Powder is most fresh and powerful, it does equal the swiftness of the Earth. And yet,

[f] *Messin praefat. ad Narrat. Rhet.* Fromond. *Vesta. tract.* 1. *cap.* 3.

1. A Bullet, or Cloud, is carried in its whole Body, being fain to break its way through the Air round about it: but now the Earth (in respect of this first Motion) does remain still in the same scituation,

ation, and move only about its own Center.

2. The Motion of a Bullet is violent, and againſt its Nature, which does ſtrongly incline it to move downwards. Whereas the Earth being conſidered as whole, and in its proper place, is not heavy, nor does it contain any repugnancy to a Circular Motion.

6. The chief Argument on which our Adverſaries do moſt inſiſt, is this: If there were ſuch a Motion of the Earth as is ſuppoſed; then thoſe Bodies which are ſevered from it in the Air, would be forſaken by it. The Clouds would ſeem to riſe and ſet as the Stars. The Birds would be carried away from their Neſts. No heavy Body could fall perpendicular. An Arrow or Bullet being ſhot from Eaſt to Weſt, by the ſame violence, will not be carried an equal diſtance from us, but we ſhould, by the revolution of our Earth, overtake that which was ſhot to the Eaſt, before it could fall. If a Man, leaping up, ſhould abide in the Air but one ſecond ſcruple of an hour, or the ſixtieth part of a minute, the Earth, in that ſpace, would withdraw it ſelf from him almoſt a quarter of a mile. All theſe, and many other ſuch ſtrange Inferences, which are directly contrary to ſenſe and experience, would follow from this motion of the Earth,

Ariſtot. *de Cœlo*, *l.* 2. *c.* 13.

There are three ſeveral ways moſt frequently uſed for the reſolving of theſe kind of Doubts.

1. From thoſe Magnetical Qualities, which all Elementary Bodies do partake of.
2. From the like motions of other things within the room of a ſailing Ship.
3. From the like participation of motion in the open parts of a Ship.

1. For thoſe Magnetical Properties, with which all theſe Bodies are endowed. For the better underſtanding of this, you muſt know, That beſides thoſe common Elementary Qualities of Heat, Coldneſs, Drineſs, Moiſture, &c. which ariſe from the predominancy of ſeveral Elements; there are likewiſe other Qualities (not ſo well known to the Ancients) which we call *Magnetical*, of which every Particle in the Terreſtrial Globe does neceſſarily participate: and whether it be joined to this Globe by continuity or contiguity; or whether it be ſevered from it, as the Clouds in the ſecond Region, a Bird or Bullet in the Air; yet does it ſtill retain its Magnetical Qualities, together with all thoſe Operations that proceed from them.

Now from theſe Properties do we ſuppoſe the Circular Motion of the Earth to ariſe.

If you aſk, What Probabilities there are, to prove that the Earth is endowed with any ſuch affections? I anſwer: 'Tis likely, that the

the lower parts of this Globe, do not consist of such a soft fructifying Earth, as there is in the Surface, (because there can be no such use for it as here, and Nature does nothing in vain) but rather of some hard rocky substance, since we may well conceive, that these lower parts are pressed close together, by the weight of all those heavy Bodies above them. Now, 'tis probable, that this rocky Substance is a Loadstone, rather than a *Jaspis*, *Adamant*, *Marble*, or any other; because experience teacheth us, that the Earth and Loadstone do agree together in so many Properties. Suppose a Man were to judg the Matter of divers Bodies; each of which should be wrap'd up in some covering from his Eye, so that he might only examine them by some other outward signs; If in this examination, he should find any particular Body which had all the Properties that are peculiar to a Loadstone, he would in reason conclude it to be of that Nature, rather than any other. Now there is altogether as much reason why we should infer, that the inward parts of the Earth do consist of a Magnetical Substance. The agreement of these two, you may see largely set forth in the Treatise of Dr. *Gilbert*. I will instance only in one Example, which of it self may sufficiently evidence, that the Globe of Earth does partake of the like affections with the Loadstone. In the Mariner's Needle, you may observe the Magnetical Motions of *Direction*,

on, Variation, Declination; the two last of which are found to be indifferent, according to the variety of places. Now this difference cannot proceed from the Needle it self, because that is the same every where. Nor can we well conceive how it should be caused by the Heavens; for then the Variation would not be always alike in the same place, but diverse, according to those several parts of the Heaven, which at several times should happen to be over it: And therefore it must necessarily proceed from the Earth, which being it self endowed with Magnetical Affections, does diversly dispose the Motions of the Needle, according to the difference of that disponent virtue, which is in its several Parts.

Now, to apply this unto the particular Instances of the Objection: We say, though some parts of this great Magnet, the Earth, may, according to their Matter, be severed from the whole; yet are they always joined to it, by a communion of the same Magnetical Qualities; and do no less observe these kind of Motions, when they are separated from the whole, than if they were united to it. Nor need this seem incredible, that a heavy Bullet, in such a swift violent course, should be able to observe this Magnetical Revolution of the whole Earth; when as we see that those great Bodies of *Saturn*, *Jupiter*, *&c.* hanging in the vast spaces of the Ætherial Air, do so constantly and regularly move on in their appointed courses.

Though

Though we could not ſhew any ſimilitude of this Motion in theſe inferior Bodies, with which we are acquainted; yet we muſt know, there may be many things which agree to the whole Frame, that are not diſcernable in divers parts of it. 'Tis natural unto the Sea to ebb and flow, but yet there is not this Motion in every drop or bucket of Water. So if we conſider every part of our Bodies ſeverally, the Humors, Bones, Fleſh, *&c.* they are all of them apt to tend downwards, as being of a condenſed Matter; but yet conſider them according to the whole Frame, and then the Blood or Humors may naturally aſcend upwards to the Head, as well as deſcend to any of the lower parts. Thus the whole Earth may move round, though the ſeveral parts of it have not any ſuch particular Revolution of their own. Thus likewiſe, though each condenſed Body being conſidered by it ſelf, may ſeem to have only a Motion of deſcent, yet in reference to that whole Frame, of which it is a part, it may alſo partake of another Motion that may be natural unto it.

But ſome may here object: Though the Earth were endowed with ſuch Magnetical Affections, yet what probability is there that it ſhould have ſuch a Revolution? I anſwer: 'Tis obſerved of thoſe other Magnetical Bodies of *Saturn*, *Jupiter*, and the Sun, that they are carried about their own Centers; and therefore 'tis not improbable,

but

but that it may be so with the Earth also; which if any deny, he must shew a reason why in this respect they should be unlike.

Yea, but though the Earth did move round, what ground is there to affirm, that those Bodies which are severed from it, as a Bullet, or the Clouds, should follow it in the same course?

I answer: Those Spots which are discovered about the Sun, and are thought to be Clouds or Evaporations from his Body, are observed to be carried about according to his Revolution. Thus the Moon is turned round by our Earth; the four lesser Planets by the Body of *Jupiter*. Nay, thus all the Planets, in their several Orbs, are moved about by the Revolution of the Sun upon its own *Axis* (saith *Kepler*) and therefore much more may an Arrow, or Bullet, be carried round by the Magnetical Motion of our Earth.

The second way, whereby some answer unto the Instances of this Argument, is, by shewing the like Motions of other things, within some Room of a sailing Ship. Thus Experience teaches, (say they) that a Candle, as also the Fumes that come from it, will always keep the same scituation, in the swiftest motion of a Ship, as if it did rest immovably, and the Flame will not more especially bend one way, or have any trembling fluctuation, but burn as streight and quietly, as if it did stand still. Again, it

has

has been found, (say those that have been versed in these kind of Experiments) that the same force will cast a Body but an equal distance, whether or no the Body do move with, or against the motion of the Ship. As also, that any Weight being let fall, will descend in as true a perpendicular, as if the Ship did stand still. If a Man, leaping up, do tarry in the Air one second scruple of an hour, yet the Ship will not, in its greatest swiftness (as it should according to the calculation of our Adversaries) be carried from him at least fifteen foot. If we suppose a Man to jump in such a Ship, he will not be able to pass farther, when he jumps against the motion of it, than when he jumps with it. All which Particulars may argue, that these things are carried along together, by the common motion of the Ship. Now if Bodies may be thus jointly moved by such a preternatural motion, much more then will they accompany the Earth in its Diurnal Revolution, which we suppose to be natural unto them, and as a Law imposed by God in their first Creation.

If the Flame of a Candle, or the Smoke that comes from it, (things that are so easily moveable) are, notwithstanding, carried so equally, and without any disturbance, by the motion of a Ship; then also the Clouds in the Air, and all other light Bodies, may well enough be turned about by the Revolution of our Earth.

If

If an equal force will cast an heavy Body but at an equal distance, whether or no it move with, or against the motion of the Ship; then may we easily conceive, that an Arrow, or Bullet, being shot with the same violence, will pass but the same space on the Earth, whether or no it be shot towards the East or West.

If a heavy Body, while the Ship does move, will fall down in a streight Line; then it is not the Revolution of our Earth that can hinder a perpendicular descent.

If a Man, leaping up in a Ship, may abide in the Air one second scruple of an hour, and yet this Ship, in its greatest swiftness, not withdraw it self fifteen foot; then will not the Earth, in that space, go from him almost a quarter of a mile.

Fromond. *Vesta. tract. 2. cap. 2.*

But against this, 'tis Objected, That the Earth has the similitude of an open Ship, and not of any Room that is close. And tho it be true, that when the Roof and the Walls do all move together, the Air which is included betwixt them, must be carried along by the same motion; yet it is not so with the Earth, because that hath not any such Walls or Roof, wherein it may contain and carry along with it the *Medium*. And therefore Experience will rather argue against this supposed Revolution. Thus 'tis observed, that a Stone being let fall from the Mast of a Ship, that moves swiftly, will not descend to the same point, as if the Ship did stand still. From whence it will follow,

that

that if our Earth had such a Circular Motion, then any heavy Body, being let fall from some high Tower, or other steep place, would not descend unto that point of Earth which was directly under it at the beginning.

To this we answer: That the Air which moves along with our Earth, is as well limited in certain bounds, as that which is included in a Room. If you ask where these Bounds are terminated: I answer, Neither by the utmost parts of the World, nor yet by the Concavity of the Moon's Orb, (as *Fromondus* would have us affirm) but by the Sphere of vaporous Air that encompasses our Earth; or which is all one, by the Orb of Magnetical Vigour, which proceeds from it. And besides, 'tis considerable, that all Earthly Bodies are not only contained within these limits, as things are in a close Room, but also as parts in that Whole to which they belong.

2. Though the carrying along of the *Medium*, may solve the motion of light Bodies in a Ship, as the Flame of a Candle, Smoke, or the like, yet this cannot concur to that which hath been said of heavy Bodies, as a Man leaping up, a Bullet descending, *&c.* since it is not the motion of the meer Air that is able to make these partake of the same motion with the Ship. Unto that Argument which he urges from the Experiment of a Stone falling in an open Ship: We answer:

1. Though

1. Though the instance of a Ship, may serve as a proof for this opinion, it being an Argument, *a minori ad majus*, from an accidental Motion, to a natural; yet it will not serve against it. For though it were not thus in accidental Motions, yet this would not hinder but that it might be so in those that are supposed to be proper and natural. As for that Experiment it self, 'tis but a groundless imagination, and was never yet confirmed by any particular Experience, because 'tis certain the Event would be clean otherwise, as shall be proved in the third way of answering.

3. The third and last way of clearing the Doubts in the sixth Argument, is, by shewing the like participation of motion, in those things that are in the open parts of a Ship. To which purpose *Galileus* urges this Experiment: If any one should let fall a Stone from an high Mast, he would find, *Lapidem in eandem semper Navis locum decidere, sive consistat illa, sive quamcunque velocitate moveatur.* That the Stone would always descend unto the very same place, whether or no the Ship did move or stand still. The Reason of which is, because the Motion of the Ship is likewise impressed in the Stone: which Impression is not equally prevalent in a light Body, as a Feather, or Wool; because the Air, which has power over them, is not carried along by the same motion of the Ship. Thus likewise will it be in this other experi-

Syst. Mundi. Collog. 2.

experiment; If a Man upon a running Horſe, ſhould, in his ſwifteſt courſe, let fall a Bullet, or Stone, theſe heavy Bodies, beſides their own deſcent, would alſo participate that tranſverſe motion of the Horſe. For as thoſe things that are thrown from us, do continue their motion when they are out of the hand in the open Air: ſo likewiſe muſt it be, when the force is conferred by that motion which the Arm has from the Horſe. While a Man is riding, his Arm is alſo carried by the ſame ſwiftneſs of the Horſe; therefore, if he ſhould only open his Hand, and let fall any thing, it would not deſcend in a ſtrait Line, but muſt neceſſarily be driven forward, by reaſon of that force impreſſed in it by the ſwiftneſs of the Horſe, which is alſo communicated to the Arm; it being all one in effect, whether or no the Arm be moved by a particular motion of its own, as it is in caſting of things from us, or by the common motion of the Body, as it is in dropping any thing from us, either when we are on the top of ſome ſailing Ship, as in the former, or on ſome running Horſe, as in the latter Inſtance.

What hath been ſaid concerning the Motion of *deſcent*, is likewiſe applicable, both to that which is *upward*, and that which is *tranſverſal*. So that when 'tis objected, If the Earth did move, then a Bullet that were ſhot up perpendicularly, would be forſaken by it, and not deſcend to the place from whence it aroſe? We anſwer, That

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the Cannon vvhich is upon the Earth, together vvith the Bullet in it, do partake of the ſame Circular Motion vvith the Earth; and this perhaps our Adverſaries vvill grant, vvhilſt vve ſuppoſe the Bullet to remain ſtill in the Cannon, all the difficulty vvill be, to ſhevv hovv it muſt neceſſarily obſerve the ſame motion, vvhen it is ſhot out into the open Air.

Galil. Syſt. Colleg. 2. For the better explication of this, you may note this following Figure.

Where vve ſuppoſe A C to be a Cannon perpendicularly erected, vvith a Bullet in it at B; vvhich if it vvere immovable, vve grant that the Bullet being diſcharged, muſt aſcend in a juſt perpendicular. But novv, conceive this Cannon to move along vvith the Earth, then in that ſpace of time, vvhile the Bullet, by the force of the Povvder, is aſcending to the top of the Bore, the Cannon

non will be transferred to the ſcituation D E, ſo that the Bullet muſt be moved according to the Line F G, which is not directly upright, but ſomewhat declining. Now, the motion of the Bullet in the Air, muſt neceſſarily be conformed unto that direction that is impreſſed in it by the Cannon from whence it is ſhot, and ſo conſequently it muſt be continued, according to the Line F G, and therefore will always keep perpendicularly over the Point from which it did aſcend.

If you reply, That the motion of the Bullet in the Cannon, muſt needs be ſo ſwift, that the Earth cannot carry the Cannon from C to E, in the ſame ſpace of time wherein the Bullet does move from B to A.

I anſwer: 'Tis not material whether the Earth be of a greater or leſſer ſwiftneſs than the Bullet, becauſe the Declination muſt always be proportionable to the motion of the Earth; and if we ſuppoſe this to be ſlower than the Bullet, then the Declination of the Line F G, will be ſo much the leſs.

This Truth may yet further be illuſtrated by the practice of thoſe Fowlers, who uſe to kill Birds as they are flying; Concerning which Art, 'tis commonly thought, that theſe Men direct their Aims to ſome certain ſpace in the Air, juſt before the Birds, where they conceive the Shot will meet with them in their flight; whereas, the truth is, they proceed in this caſe, the very ſame way as if the

Birds did ſtand ſtill, by a direct aiming at their Bodies, and following of their flight by the motion of the Piece; till at length, having got a perfect aim, they diſcharge, and do hit altogether as ſurely, as if the Birds were ſitting upon a Tree. From whence we may obſerve, that the motion of the Piece, as in our aiming, it is made to follow the Birds in their flight, (though it be but ſlow) yet is communicated to the Bullet in the Air.

But here it may ſeem very difficult to give any reaſon, according to thoſe grounds concerning the flight of Birds; which being animated, have a liberty to fly here or there, to tarry, for a good ſpace of time, in the open Air; and ſo 'tis not eaſy to conceive what means there is, by which they ſhould participate of the Earth's Diurnal Revolution.

To this *Galileus* anſwers, That the motion of the Air, as it does turn about the Clouds, ſo doth it alſo carry with it the Birds, together with ſuch other like things that are in it. For if ſome violent Wind be able to drive, with ſuch ſwiftneſs, a full laden Ship, to throw down Towers, to turn up Trees, and the like; much more then may the Diurnal Motion of the Air (which does ſo far exceed in ſwiftneſs the moſt tempeſtuous Wind) be able to carry with it the Bodies of Birds.

Object. But if all things be turned about by this Revolution, then it ſhould ſeem there is no ſuch

such thing as a right Motion, whether of Ascent or Descent, in a streight Line.

Sol. I answer: The moving of heavy or light Bodies, may be considered in a double relation.

1. According to the space wherein they move, and then we grant their Motions not to be simple, but mixed of a direct and circular.

2. According to the Body or *medium* wherein they move, and then they may properly be said to have right motions, because they pass through the *medium* in a streight Line; and therefore it is, that unto us they seem directly to ascend or descend. *Aristotle* himself would not deny, but that Fire may ascend in a streight Line unto its Sphere, and yet participate also of that Circular Motion which he supposes to be communicated from the Heavens, unto the upper part of the Air, and its own Region. So likewise must it be for the descent of any thing. Suppose a Ship in its swiftest motion, and a Man in it, having some Vessel filled with Water, should let fall into it a little Ball of Wax, or some other matter which may be slow in its sinking, so that in one minute it should scarce descend the space of a Cubit, though the Ship (it may be) in the same time may pass at least a hundred Cubits; yet would this still seem unto the eye to descend in a streight Line; and the other motion, which is communicated unto it by the Ship, would not at all be discernable to it.

And though in this case, the motion were in it self composed of a circular and direct; yet in respect of us it would appear, and so might be stiled exactly streight.

Now if it be thus in those which are generally granted to be preternatural Motions; we need not doubt then the possibility of the like effect in that Motion which we conceive to be proper and natural, both to the Earth, and the things that belong unto it.

There is yet another Objection to this purpose urged by * *Malapertius*, a late Jesuit, who though he does with much eagerness press this Argument concerning a Bullet or Stone, against the Opinion of *Copernicus*; yet he grants that it might easily be resolved, if the defenders of it would affirm that the Air did move round with the Earth. But this (saith he) they dare not avouch; for then the Comets would always seem to stand still, being carried about with the Revolution of this Air, and then they could not rise or set, as experience shews they do.

* *Austriaca Syder. par. 2. prop. 25.*

To this it may be answered, That most Comets are above that Sphere of Air which is turned round with our Earth, as is manifest by their height. The motion that appears in them, is caused by the Revolution of our Earth, whereby we are turned from them.

As for those which are within the Orb of our Air, these do seem to stand still. Such

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a one was that mentioned by † *Josephus*, which did constantly hang over *Jerusalem*; and that likewise which appeared about the time of *Agrippa*'s death, and for many days together did hang over the City of *Rome*. Wherefore * *Seneca* does well distinguish out of *Epigenes*, betwixt two sorts of Comets, the one being low, and such as seems immovable; the other higher, and such as did constantly observe their risings and settings, as the Stars.

† *De bello Judaico, l.7. c.12. Dion. l.54*

* *Nat. Qu. l.7. c.6.*

I have done with all the Arguments of any note or difficulty, that are urged against this diurnal motion of the Earth. Many other Cavils there are not worth the naming, which discover themselves to be rather the Objections of a captious, than a doubtful mind. Amongst which, I might justly pass over those that are set down by * *Alex. Rosse*. But because this Author does proceed in his whole with so much scorn and triumph, it will not be amiss therefore to examine what infallible evidence there is in those Arguments upon which he grounds his boastings.

* *Lib. 1. sect. 2. c.6.*

We have, in one Chapter, no less than these nine.

Arg. 1. If the Earth did move, then would it be hotter than the Water, because motion does produce heat; and for this reason likewise, the Water would be so hot and rarified, that it could not be congealed; since that also does partake of the same motion with the Earth.

Arg. 2. The Air which is next the Earth, would be purer, as being rarified with Motion.

Arg. 3. If the Earth did move the Air, it would cause some sound; but this is no more audible, than *Pythagoras* his Harmony of the Heavens.

Arg. 4. 'Twould have been in vain for Nature to have endowed the Heavens with all conditions requisite for motion, if they had been to stand still: As, first, they have a round Figure. Secondly, They have neither gravity nor levity. Thirdly, They are incorruptible. Fourthly, They have no contrary.

Arg. 5. All similary parts are of the same nature with the whole: But each part of the Earth does rest in its place; therefore also doth the whole.

Arg. 6. The Sun in the World, is as the Heart in a Man's Body: But the Motion of the Heart ceasing, none of the Members do stir; therefore also if the Sun should stand still, the other parts of the World would be without motion.

Arg. 7. The Sun and Heavens, do work upon these inferior Bodies by their Light and Motion. So the Moon does operate upon the Sea.

Arg. 8. The Earth is the Foundation of Buildings; and therefore must be firm and stable.

Arg. 9. 'Tis the constant opinion of Divines, that the Heavens shall rest after the

Day of Judgment; which they prove from *Isa.* 60. 20. *Thy Sun, shall no more go down, neither shall thy Moon withdraw it self.* So likewise, *Rev.* 10. 6. The Angel swears, *that there shall be time no longer:* and therefore the Heavens must rest, since by their motion it is that Time is measured. And St. *Paul* says, *Rom.* 8. 20. *That all the Creatures are made subject to Vanity.* Now this can be no other in the Heavens, than the Vanity of Motion, which the Wise Man speaks of, *Eccles.* 1. 4. *The Sun riseth, and the Sun goeth down,* &c.

To these it may be answered:

Ad 1, & 2. In the first you may note a manifest contradiction, when he will have the Earth to be hotter than the Water, by reason of this motion; when as notwithstanding he acknowledges the Water to move along with it; and therefore too, in the next Line, he infers that the Water, because of that heat and rarefaction which it receives from this motion with the Earth, must be incapable of so much cold, as to be congealed into Ice.

But unto that which may be conceived to be his meaning in this and the next Argument: I answer, If he had fully understood this Opinion which he opposes, he would easily have apprehended, that it could not be prejudiced by either of these Consequences. For we suppose, that not only this Globe of Earth and Water, but also all the vaporous Air which invirons it, are carried

along by the ſame motion. And therefore, though what he ſays concerning the heat, which would be produced by ſuch a motion, vvere true; yet it vvould not be pertinent, ſince our Earth and Water, and the Air next unto them, are not by this means ſevered from one another, and ſo do not come vvithin the compaſs of this Argument.

If any reply, That this vvill notwithſtanding hold true, concerning the upper part of the Air, vvhere there is ſuch a ſeparation of one Body from another; and ſo conſequently, an anſvverable heat. I anſvver;

1. 'Tis not generally granted, That motion in all kind of Bodies does produce heat; ſome reſtrain it only to ſolid Bodies; affirming, That in thoſe vvhich are fluid, it is rather the cauſe of coldneſs. This is the reaſon (ſay they) vvhy running Waters are ever to our ſenſe the cooleſt: And vvhy amongſt thoſe Winds vvhich proceed from the ſame Coaſts of Heaven, about the ſame time of the Year, the ſtrongeſt alvvays is the coldeſt? If you object, that running Waters are not ſo ſoon frozen as others: They anſvver, This is not becauſe they are thereby heated; but becauſe unto congelation, it is requiſite that a Body ſhould ſettle and reſt, as vvell as be cold.

2. If vve ſhould grant a moderate heat in thoſe parts of the Air, vve have not any experiment to the contrary, nor vvould it

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prejudice the preſent Opinion, or common Principles.

Ad 3. As the ſound of this Motion is not more heard, than the Harmony of the Heavens: ſo neither is there any reaſon vvhy this Motion ſhould cauſe a ſound, more than the ſuppoſed Motion of the Heavens, vvhich is likevviſe thought to be continued unto the Air hard by us.

Ad 4. This vvill prove the Earth to move as vvell as the Heavens; For that has, firſt, a round Figure, as is generally granted. Secondly, Being conſidered as vvhole, and in its proper place, it is not heavy, as vvas proved before: and as for the tvvo other conditions, neither are they true of the Heavens; nor if they vvere, vvould they at all conduce to their Motion.

Ad 5. This Argument vvould prove that the Sea did not ebb and flow, becauſe there is not the ſame kind of motion in every drop of Water: or that the whole Earth is not ſpherical, becauſe every little piece of it is not of the ſame Form.

Ad 6. This is rather an Illuſtration than a Proof; or if it do prove any thing, it may ſerve as well for that purpoſe unto which it is afterward applied, where the motion of every Planet is ſuppoſed to depend upon the revolution of the Sun.

Ad 7. That the Sun and Planets do work upon the Earth by their own real daily motion, is the thing in queſtion; and therefore muſt not be taken for a common Ground.

Ad 8.

Ad 8. We grant, that the Earth is firm and ſtable from all ſuch motions, whereby it is jogged, or uncertainly ſhaken.

Ad 9. 1. For the authority of thoſe Divines, which he urges for the interpretation of theſe Scriptures; this will be but a weak Argument againſt that Opinion which is already granted to be a Paradox.

2. The Scriptures themſelves, in their right meaning, will not at all conduce to the preſent purpoſe.

As for that in *Iſaiah*, if we conſult the coherence, we ſhall find that the ſcope of the Prophet, is to ſet forth the Glory of the Church Triumphant. Wherein (he ſays) there ſhall not be any need of the Sun or Moon, but God's preſence ſhall ſupply them both: *For the Lord ſhall be unto thee an everlaſting Light, and thy God thy Glory, verſ.* 19. and as for this Sun and Moon, it ſhall not go down, or withdraw it ſelf; but he ſhall be an *Everlaſting Light*, without intermiſſion. So that 'tis evident, he ſpeaks of that Light which ſhall hereafter be, inſtead of the Sun and Moon.

Vid. Rev. 21. 23. *item c.* 22. *ver.* 5.

As for that in the *Revelations*, we yield, that *Time ſhall ceaſe*; but to ſay that this depends upon the ceſſation of the Heavens, is to beg the Queſtion, and to ſuppoſe that which is to be proved, *viz.* that Time is meaſured by the Motion of the Heavens, and not of the Earth. * *Perrerius* (from whom this laſt Argument was borrowed without acknowledgment) might have told him,

Gen. c. 1. *l.* 2. *quæſt.* 6

him, in the very ſame place, that Time does not abſolutely, and univerſally depend upon the Motion of the Heavens, *ſed in motu & ſucceſſione cujuſlibet durationis*, but in any ſuch ſucceſſion, by which duration may be meaſured.

As for that in the *Romans*, we ſay, that there are other Vanities to which the Heavenly Bodies are ſubject. As firſt, unto many changes and alterations, witneſs thoſe Comets, which at ſeveral times have been diſcerned amongſt them; and then likewiſe to that general corruption, in which all the Creatures ſhall be involved at the laſt Day. *When they ſhall paſs away with a great noiſe, and the Elements ſhall melt with fervent heat.* 2 Pet. 3. 10, 12.

Thus you ſee, there is not any ſuch invincible ſtrength in theſe Arguments, as might cauſe the Author of them to triumph before-hand with any great noiſe of victory.

Another Objection like unto theſe, is taken from the Etymology of ſeveral words. Thus the Heavens are called *Æthera, ab* ἀεὶ θεῖν, becauſe they are always in motion; and the Earth *Veſta, quia vi ſtat*, becauſe of its immobility.

To which I anſwer: 'Twere no difficult matter to find ſuch proofs for this opinion, as well as againſt it.

Thus we may ſay, that the Hebrew word שָׁמַיִם, is derived from שָׁמַר, *quia currit*; and *Terra, non quod teratur, ſed quod perenni curſu*

cursu omnia terat, saith *Calcagninus*. However, though we suppose the Etymology to be never so true and genuine, yet it can at the best but shew what the more common opinion was of those times when such names were first imposed.

Ob. But suppose all this were so, That the Earth had such a diurnal Revolution; yet how is it conceivable, that it should at the same time have two distinct Motions.

I answer: This may easily be apprehended, if you consider how both these Motions do tend the same way, from West to East. Thus a Bowl being turned out of the hand, has two Motions in the Air; one, whereby it is carried round; the other, whereby it is cast forward.

From what hath been delivered in this Chapter, the indifferent Reader may gather some satisfaction for those Arguments which are usually urged against this Diurnal Motion of the Earth.

PROP.

PROP. IX.

That it is more probable the Earth does move, than the Sun or Heavens.

AMongſt thoſe many Arguments that may be urged for the confirmation of this Truth, I ſhall only ſet down theſe five.

1. If we ſuppoſe the Earth to be the cauſe of this Motion, then will thoſe vaſt and glorious Bodies of the Heavens, be freed from that inconceivable, unnatural ſwiftneſs, which muſt otherwiſe be attributed unto them.

For if the Diurnal Revolution be in the Heavens, then it will follow, according to the common *Hypotheſis*, that each Star in the *Equator*, muſt in every hour move at the leaſt 4529538 German miles. So that according to the obſervation of * *Cardan*, who tells us, that the Pulſe of a well-tempered Man, does beat 4000 times in an hour; one of the Stars in that ſpace, whilſt the Pulſe beats once, muſt paſs 1132 German miles (ſaith *Alphraganus*): Or, according to *Tycho*, 732 German miles. But theſe numbers ſeem to be ſomewhat of the leaſt; and therefore many others do much enlarge them, affirming that every Star in the

Vid. Maſt. Epit. Aſtr. l. 1 in fine.

**De Prop. l. 5 prop. 58*

the *Equator*, in one beating of the Pulse, must move 2528 of these miles.

†*Commen. in prim. cap. Spher.*

'Tis the Assertion of †*Clavius*, that though the distance of the Orbs, and so consequently their swiftness, seem to be altogether incredible; yet it is rather far greater in it self, than Astronomers usually suppose it; and yet (saith he) according to the common Grounds, every Star in the *Equator*, must move 42398437½ miles in an hour. And though a Man should constantly travel 40 miles a day, yet he would not be able to go so far as a Star does in one hour, under 2904 Years: Or if we will suppose an Arrow to be of the same swiftness, then must it compass this great Globe of Earth and Water 1884 times in an hour. And a Bird that could but fly as fast, might go round the World seven times in that space, whilst one could say, *Ave Maria, gratia plena, Dominus tecum.*

Which though it be a pretty round pace, yet you must conceive that all this is spoken only of the eighth Sphere; and so being compared to the swiftness of the *Primum Mobile*, is but a slow and heavy Motion.

For (saith the same Author) the thickness of each Orb is equal to the distance of its concave Superficies from the Centre of the Earth. Thus the Orb of the Moon does contain as much space in its thickness, as there is betwixt the nearest part of that and the Centre. Thus also the eight Sphere

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is as thick as that whole ſpace betwixt the Centre of the Earth, and its own concave Superficies. So likewiſe muſt it be in thoſe three other Orbs, which he ſuppoſes to be above the ſtarry Heaven. Now if we proportion their ſwiftneſs according to this difference in their bigneſs, you may then conceive (if you can) what a kind of celerity that muſt be, by which the *Primum Mobile* will be whirled about.

Tycho makes the diſtance of the Stars to be much leſs, and their motion ſlower; and yet he is fain to confeſs, that it is *omni cogitatione celerior.*

Clavius likewiſe, ſpeaking concerning the ſwiftneſs of the Starry Orb, does acknowledg, *Quod velocitas ejus captum humani ingenii excedit.* What then could he think of the *Primum Mobile?*

Dr. *Gilbert* being (it ſeems) aſtoniſhed at the conſideration of this ſtrange ſwiftneſs, ſays of it, that it is *motus ſupra omnes cogitationes, ſomnia, fabulas, & licentias poeticas inſuperabilis, ineffabilis, incomprehenſibilis.* A man may more eaſily conceive the poſſibility of any Fable or Fiction, how Beaſts and Trees might talk together, than how any material Body ſhould be moved with ſuch a ſwiftneſs. *De magnete lib. 6. cap. 3.*

Not but that 'tis poſſible for God to turn them about with a far greater velocity. Nay, 'tis poſſible for Art to contrive a motion, which ſhall be equally ſlow in that proportion as this is ſwift. But however, the

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queſtion here is, not what can be done, but what is moſt likely to be done, according to the uſual courſe of Nature. 'Tis the part of a Philoſopher, in the reſolution of natural Events, not to fly unto the abſolute Power of God, and tell us what he can do, but what, according to the uſual way of Providence, is moſt likely to be done, to find out ſuch cauſes of things, as may ſeem moſt eaſy and probable to our reaſon.

If you ask, What repugnancy there is in the Heavens, unto ſo great a ſwiftneſs? We anſwer; Their being ſuch vaſt, material condenſed Subſtances, with which this inconceivable Motion cannot agree.

Since Motion and Magnitude are two ſuch Geometrical things, as bear a mutual proportion to one another; therefore it may ſeem convenient, that ſlowneſs ſhould be more agreeable to a great Body, and ſwiftneſs to a leſſer: and ſo it would be more conſonant to the Principles of Nature, that the Earth, which is of a leſſer quantity, ſhould be appointed to ſuch a Motion, as is ſomewhat proportionable to its bigneſs, than that the Heavens, that are of ſuch a vaſt magnitude, ſhould be whirled about with ſuch an incredible ſwiftneſs, which does ſo far exceed the proportion of their bigneſs, as their bigneſs does exceed this Earth, that is but as a Point or Centre to them. 'Tis not likely that Nature, in theſe conſtant and great Works, ſhould ſo much deviate from that uſual Harmony and Proportion

portion which ſhe obſerves in leſſer Matters. If this Globe of Earth only were appointed to move every day round the Orb of the fixed Stars, though it be but a little Body, and ſo more capable of a ſwift motion; yet that ſwiftneſs would be ſo extreamly diſproportionable unto it, that we could not with reaſon conceive it poſſible, according to the uſual courſe of Nature. But now, that the Heavens themſelves, of ſuch ſtrange bigneſs, with ſo many Stars, which do ſo far exceed the Magnitude of our Earth, ſhould be able to turn about with the ſame celerity; Oh! 'tis altogether beyond the fancy of a Poet, or a Madman.

For anſwer unto this Argument, our Adverſaries tell us, that there is not in the Heavens any repugnancy to ſo ſwift a Motion; and that whether we conſider the nature of thoſe Bodies; or, ſecondly, the ſwiftneſs of this Motion.

1. For the Nature of thoſe Bodies, either their { *Qualities.* / *Quantity.*

1. There is not in them the Qualities of lightneſs or heavineſs, or any the leaſt contrariety that may make them reluctant to one another.

2. Their Magnitude will help them in their ſwiftneſs: For the greater any Body is, the quicker will it be in its motion, and that not only when it is moved by an inward Principle, as a Millſtone will deſcend faſter Roſſ. *lib.* 11 *ſect.* 1. *col.*

than a little Pebble; but also when its Motion does proceed from some external Agent, as the Wind will drive a great Cloud, or a heavy Ship, when it is not able to stir a little Stone.

2. As for the swiftness of this Motion, the possibility of it may be illustrated by other Particulars in Nature: As,

Idem lib. 2 sect. 1. c. 5. 1. The sound of a Cannon, in a little time, is carried for twenty miles distance.

2. Though a Star be scituate so remotely from us; yet the Eye discerns it in a moment, which is not without some motion, either of the Species of the Star, or the *Idem lib. 1 sect. 1. c 2.* Rays of the Eye. Thus also the Light does in an instant pass from one side of the Heaven to another.

3. If the force of Powder be able to carry a Bullet with so great a swiftness, we need not doubt then, but that the Heavens are capable of such a celerity, as is usually attributed unto them.

Unto these it may be answered:

1. Where they say that the Heavenly Bodies are without all gravity; we grant it, in the same sense as our Earth also, being considered as whole, and in its proper place, may be denied to be heavy: since this Quality, in the exactest sense, can only be ascribed unto such parts as are severed from the whole to which they belong. But however, since the Heavens, or Stars, are of a material Substance, 'tis impossible but there should be in them some ineptitude to Motion;

on; because Matter is of it self a dull and sluggish thing; and by so much the more, as it is kept close and condensed together. And though the followers of *Ptolomy*, do with much confidence deny the Heavens to be capable of any reluctancy to motion; yet it were easy to prove the contrary, out of their own Principles. 'Tis not conceivable, how the upper Sphere should move the nether, unless their Superficies were full of rugged parts, (which they deny:) or else one of the Orbs must lean upon the other with its weight, and so make it partake of its own Motion. And besides, they tell us, that the farther any Sphere is distant from the *Primum Mobile*, the less is it hindred by that in its proper course, and the sooner does it finish its own Revolution. From whence it will easily follow, that these Bodies have resistancy from one another.

I have often wondred, why amongst the inchanted Buildings of the Poets, they have not fained any Castle to be made of the same Materials with the solid Orbs, since in such a Fabrick, there would have been these eminent Conveniences.

1. It must needs be very pleasant, by reason of its perspicuity, because it is more diaphanous than the Air it self, and so the Walls of it could not hinder the prospect any way.

2. Being so solid and impenitrable, it must needs be excellent against all violence of Weathers, as also against the assaults of

the Enemy, who ſhould not be able to break it with the moſt furious Batteries of the Ram, or pierce it with any Cannon-ſhot.

3. Being void of all heavineſs, a Man may carry it up and down with him, as a Snail does his Houſe: and ſo, whether he follow the Enemy, or fly from him, he has ſtill this advantage, that he may take his Caſtle and Defence along with him.

But then again, there are on the other ſide as many inconveniences. For,

1. Its perſpicuity would make it ſo open, that a Man ſhould not be able to retire himſelf into any private part of it. And then,

2. Being ſo extreamly ſolid, as well as inviſible, a Man ſhould be ſtill in danger of knocking his head againſt every Wall and Pillar; unleſs it were alſo intangible, as ſome of the *Peripateticks* affirm.

3. Its being without all gravity, would bring this inconvenience, that every little puff of Wind would blow it up and down; ſince ſome of the ſame Sect are not aſhamed to ſay, that the Heavens are ſo utterly devoid of Heavineſs, that if but a little Fly ſhould juſtle againſt the vaſt Frame of the Celeſtial Spheres, he would move them out of their places.

A ſtrong Fancy, that could be at leiſure, might make excellent ſport with this Aſtronomical Fiction.

So

So that this firſt evaſion of our Adverſaries, will not ſhelter them from the force of that Argument, which is taken from the incredible ſwiftneſs of the Heavens.

2. Whereas they tell us, in the ſecond place, that a bigger Body, as a Millſtone, will naturally deſcend ſwifter than a leſs, as a Pebble. I anſwer: This is not becauſe ſuch a great Body is in it ſelf more eaſily movable; but becauſe the bigger any thing is which is out of its own place, the ſtronger will be its natural deſire of returning thither, and ſo conſequently the quicker its motion. But now thoſe Bodies that move circularly, are always in their proper ſcituations, and ſo the ſame reaſon is not applyable unto them. And then, whereas 'tis ſaid, that Magnitude does always add to the ſwiftneſs of a violent motion, (as Wind will move a great Ship ſooner than a little Stone): We anſwer, This is not becauſe a Ship is more eaſily movable in it ſelf than a little Stone: For I ſuppoſe, the Objector will not think he can throw the one as far as the other, but becauſe theſe little Bodies are not ſo liable to that kind of violence, from whence their Motion does proceed.

As for thoſe Inſtances which are cited to illuſtrate the poſſibility of this ſwiftneſs in the Heavens, we anſwer: The paſſage of a Sound, is but very ſlow in compariſon to the motion of the Heavens. And then beſides, the ſwiftneſs of the Species of Sound

or Sight, which are Accidents, are not fit to infer the like celerity in a material substance. And so likewise for the Light which * *Aristotle* himself, and with him the generality of Philosophers, do for this very reason prove not to be a Body, because it moves with such swiftness, of which (it seems) they thought a Body to be incapable. Nay, the † Objector himself, in another place, speaking of Light in reference to a Substance, does say; *Lumen est accidens, sit species rei visæ, & alia est ratio substantiarum, alia accidentium.*

* *De Anim. l. 2. c. 7*

† Roff. *l. 2. sect. 1. c. 4.*

To that of the Bullet, we answer: He might as well have illustrated the swiftness of a Bullet, which will pass four or five miles in two minutes, by the motion of a hand in a Watch, which passes two or three inches in twelve hours; there being a greater disproportion betwixt the motion of the Heavens, and the swiftness of a Bullet, than there is betwixt the swiftness of a Bullet, and the motion of a Hand in a Watch.

Arg. 2. Another Argument to this purpose, may be taken from the chief end of the Diurnal and Annual Motions, which is to distinguish betwixt Night and Day, Winter and Summer; and so consequently, to serve for the Commodities and Seasons of the habitable World. Wherefore it may seem more agreeable to the Wisdom of Providence, for to make the Earth as well the efficient, as the final cause of this motion:

tion: Especially since nature in her other Operations does never use any tedious difficult means, to perform that which may as well be accomplished by shorter and easier ways. But now, the appearances would be the same, in respect of us, if only this little Point of Earth were made the subject of these Motions, as if the vast Frame of the World, with all those Stars of such number and bigness, were moved about it. 'Tis a common Maxim, Μάτην ἐιχῶ τὸν φύσιν ἐργάζεσθαι. Nature does nothing in vain, but in all her courses does take the most compendious way. 'Tis not therefore (I say) likely, that the whole Fabrick of the Heavens, which do so much exceed our Earth in magnitude and perfection, should be put to undergo so great and constant a Work in the service of our Earth, which might more easily save all that labour, by the Circumvolution of its own Body; especially, since the Heavens do not by this motion attain any farther perfection for themselves, but are made thus serviceable to this little Ball of Earth. So that in this case it may seem to argue as much improvidence in Nature to imploy them in this motion, as it would in a * Mother, who in warming her Child, would rather turn the Fire about that, than that about the Fire. Or in a † Cook, who would not roast his Meat, by turning it about to the Fire; but rather, by turning the Fire about it. *Or in a Man, who

Galen.

*Lansberg

† Kepler.

* Galileus.

aſcending ſome high Tower, to ſave the labour of ſtirring his Head, ſhould rather deſire that all the Regions might ſucceſſively be turned before his Eye, that ſo he might eaſily take a view of them.

We allow every Watch-maker ſo much wiſdom, as not to put any Motion in his Inſtrument, which is ſuperfluous, or may be ſupplied an eaſier way: And ſhall we not think that Nature has as much providence as every ordinary Mechanick? Or can we imagine that She ſhould appoint thoſe numerous and vaſt Bodies, the Stars, to compaſs us with ſuch a ſwift and reſtleſs Motion, ſo full of confuſion and uncertainties, when as all this might as well be done by the Revolution of this little Ball of Earth?

Arg. 3. Amongſt the ſeveral parts of the World, there are ſix Planets which are generally granted to move. As for the Sun and the Earth, and the fixed Stars, it is yet in queſtion, which of them are naturally indowed with the ſame condition. Now common reaſon will dictate unto us, that Motion is moſt agreeable to that which in kind and properties is moſt near to thoſe Bodies that undoubtedly are moved. But now there is one eminent qualification, wherein the Earth does agree with the Planets; whereas the Sun, together with the fixed Stars, do in the ſame reſpect differ from them: and that is Light, which all the Planets, and ſo too the Earth, are fain

to

to borrow elſewhere, whilſt the Sun and the Stars have it of their own. From whence it may be probably concluded, that the Earth is rather the Subject of this Motion than the other. To this it may be added, that the Sun and Stars ſeem to be of a more excellent Nature than the other parts of the World, and therefore ſhould in reaſon be endowed with the beſt qualifications. But now Motion is not ſo noble a condition as Reſt: that is but a kind of wearifom and ſervile thing, whereas this is uſually aſcribed to God himſelf; Of whom 'tis ſaid;

* *Immotus ſtabiliſq; manens dans cuncta moveri,* * Boet. *de Conſol. Phil. l.* 3.

Arg. 4. † *Ariſtotle* tells us, 'Tis very agreeable to reaſon, that the time appointed for the Revolution of each Orb, ſhould be proportionable to its bigneſs. But now this can only be, by making the Earth a Planet, and the Subject of the Annual and Diurnal Motions. Wherefore 'tis probable, that this does rather move than the Heavens. † *De Cælo, l.* 2. *c.* 10.

According to the common *Hypotheſis*, the *Primum Mobile* will move round in a day. *Saturn* in thirty Years. *Jupiter* in twelve. *Mars* in two. The *Sun*, *Venus*, and *Mercury*, which have ſeveral Orbs, yet will agree in their Revolutions, being each of them about a Year in finiſhing their Courſes: Whereas, by making the Earth a Planet, there will be a juſt proportion betwixt the bigneſs

bigness of the Orbs, and the time of their Motions: For then, next to the Sun, or Centre, there will be the Sphere of *Mercury*; which as it is but narrow in its Diameter, so likewise is it quick in its Motion, running its Course in eighty eight days: *Venus*, that is next unto it, in 224 days: The *Earth* in 365 days, or a Year: *Mars* in 687 days: *Jupiter* in 4332 days: *Saturn* in 10759 days. Thus likewise is it with those *Medicean* Stars that encompass *Jupiter*. That which is lowest amongst them, finishes his Course in two and twenty hours; the next in three days and an half; the third in seven days; and the farthest in seventeen days. Now as it is (according to *Aristotle*'s confession) more likely that Nature should observe such a due proportion betwixt the Heavenly Orbs; so is it more probable, that the Earth should move, rather than the Heavens.

Arg. 5. This may likewise be confirmed from the appearance of Comets: Concerning which, there are three things commonly granted; or if they were not, might be easily proved: Namely,

1. That there are divers Comets in the Air, betwixt the Moon and our Earth.

2. That many of these Comets do seem to rise and set as the Stars.

3. That this appearing Motion is not properly their own, but communicated unto them from somewhat else.

But

But now, this Motion of theirs cannot be cauſed by the Heavens; and therefore it muſt neceſſarily proceed from the Revolution of our Earth.

That the Moon's Orb cannot carry along with it the greater part of the Air wherein theſe Comets are placed, might eaſily be proved from the common Grounds. For the Concave Superficies of that Sphere, is uſually ſuppoſed to be exactly terſe and ſmooth; ſo that the meer touch of it cannot turn about the whole Element of Fire, with a Motion that is not natural unto it. Nor could this Elementary Fire, which they imagine to be of a more rarified and ſubtil Nature, communicate the ſame Motion to the thicker Air, and that to the Waters (as ſome affirm): For by what means could that ſmooth Orb take hold of the adjoining Air? To this *Sarſius* anſwers, that there are great Gibboſities, and mountainous Inequalities, in the Concavity of the loweſt Sphere, and by theſe is it enabled to carry along with it the Fire and Air. But * *Fromondus* tells him, *Fictitia iſta, & ad fugam repertæ ſunt.* And yet his own Conjecture is ſcarce ſo good, when he affirms, that this Motion of the Ætherial Air, as alſo of that Elementary Air hard by us, is cauſed *by* that ruggedneſs which there is in the Bodies of the Planets; of which Opinion, we may, with as good reaſon, ſay as he ſays to *Sarſius*: *Fictitia iſta, & ad fugam repetita*; Theſe things are meer Fictions, invented

* *Antariſt. cap.* 16.

ted for ſhifts, and without any probable ground.

But now, this appearance of the Comets may eaſily be reſolved, if we ſuppoſe the Earth to move. For then, though they did ſtill remain in their wonted places; yet this, by its Diurnal Revolution, ſucceſſively withdrawing it ſelf from them, they will appear to riſe and ſet. And therefore, according to this common natural Experiment, it is more probable that the Earth ſhould move, than the Heavens.

Another Argument urged by ſome, to prove that this Globe of Earth is eaſily movable, is taken from the Opinion of thoſe who affirm, that the acceſs of any Weight unto a new place, as ſuppoſe an Army, does make the Earth poiſe it ſelf afreſh, and change the Centre of Gravity that it had before; but this is not generally granted, and therefore not to be inſiſted on as a common ground.

Vid. Vaſq. *l.* 1. *diſp.* 2. *cap.* 816.

To this purpoſe likewiſe is that Inference of *Lansbergius*, who from *Archimedes* his ſaying, that he could move the Earth, if he knew where to ſtand and faſten his Inſtrument; concludes, that the Earth is eaſily movable: whereas it was the intent of *Archimedes*, in that Speech, to ſhew the infinite power of Engines; there being no Weight ſo great, but that an Inſtrument might be invented to move it.

Before we finiſh this Chapter, 'tis requiſite that we enquire what kind of Faculty that

that is, from which theſe Motions that *Copernicus* aſcribes unto the Earth, does proceed. Whether or no it be ſome Animal Power that does aſſiſt (as *Ariſtotle*), or inform (as *Keplar* thinks), or elſe ſome other natural motive Quality which is intrinſical unto it.

We may obſerve, That when the proper genuine cauſe of any Motion is not obvious, Men are very prone to attribute unto that which they diſcern to be the moſt frequent Original of it in other things, Life. Thus the *Stoicks* affirm, the Soul of the Water to be the cauſe of the ebbing and flowing of the Sea. Thus others think the Wind to proceed from the Life of the Air, whereby it is able to move it ſelf ſeveral ways, as other living Creatures. And upon the ſame grounds do the *Platonicks*, *Stoicks*, and ſome of the *Peripateticks*, affirm the Heavens to be animated. From hence likewiſe it is, that ſo many do maintain *Ariſtotle* his Opinion concerning *Intelligences*: which ſome of his Followers, the School-men, do confirm out of Scripture, from that place in *Matth.* 24. 29. where 'tis ſaid, *The Powers of the Heavens ſhall be ſhaken.* In which words, by *Powers*, (ſay they) are meant the Angels, by vvhoſe power it is that the Heavens are moved. And ſo likewiſe in that, *Job* 9. 13. vvhere the Vulgar has it, *Sub quo curvantur, qui portant orbem*; that is, the *Intelligences*. Which Text, might ſerve altogether as vvell to prove the Fable of

Sen. *Nat. Qu. lib.* 5. *cap.* 5, 6.

Atlas

Atlas and *Hercules*. Thus *Cajetan* concludes from that place in *Psalm* 136. 5. where 'tis said, *God by wisdom made the Heavens*: or, according to the Vulgar, *Qui fecit Cælos intellectu*, That the Heavens are moved by an intelligent Soul.

If we consider the Original of this Opinion, we shall find it to proceed from that mistake of *Aristotle*, who thought the Heavens to be Eternal; and therefore to require such a moving cause, as being of an immaterial Substance, might be exempted from all that weariness and inconstancy, which other things are liable unto.

But now this ground of his is evidently false, since 'tis certain, That the Heavens had a beginning, and shall have an end. However, the imploying of Angels in these Motions of the World, is both superfluous and very improbable.

1. Because a natural Power, intrinsical to those Bodies, will serve the turn as well. And as for other Operations, which are to be constant and regular, Nature does commonly make use of some inward Principle.

2. The *Intelligences* being immaterial, cannot immediatly work upon a Body. Nor does any one tell us what Instruments they should make use of in this business. They have not any hands to take hold of the Heavens, or turn them about. And that Opinion of *Aquinas*, *Durand*, *Sancinas*, with other

other School-men, seems to be without all reason; who make the Faculty, whereby the Angels move the Orbs, to be the very same with their Understandings and Will: So that if an Angel do but meerly suspend the Act of willing their Motion, they must necessarily stand still; and on the contrary, his only willing them to move, shall be enough to carry them about in their several Courses. Since it were then a needless thing for Providence to have appointed Angels unto this business, which might have been done as well by the only Will of God. And besides, how are the Orbs capable of perceiving this Will in the Intelligences? Or if they were, yet what motive Faculty have they of themselves, which can inable them to obey it?

Now, as it would be with the Heavens; so likewise is it with the Earth, which may be turned about in its Diurnal Revolution, without the help of Intelligences, by some motive Power of its own, that may be intrinsical unto it.

If it be yet inquired, What cause there is of its Annual Motion? I answer: 'Tis easily conceivable, how the same Principle may serve for both these, since they tend the same way, from West to East.

However, that Opinion of *Keplar* is not very improbable, That all the Primary Planets are moved round by the Sun, which once in twenty five, or twenty six days,

days, does obſerve a Revolution about its own Axis, and ſo carry along the Planets that encompaſs it; which Planets are therefore ſlower or ſwifter, according to their diſtances from him.

If you ask, By what means the Sun can produce ſuch a Motion?

He anſwers: By ſending forth a kind of Magnetick Virtue in ſtreight Lines, from each part of its Body; of which there is always a conſtant ſucceſſion: ſo that as ſoon as one Beam of this Vigor has paſſed a Planet, there is another preſently takes hold of it, like the Teeth of a Wheel.

But how can any Virtue hold out to ſuch a diſtance?

He anſwers: Firſt, as Light and Heat, together with thoſe other ſecret Influences, which work upon Minerals in the Bowels of the Earth: ſo likewiſe may the Sun ſend forth a Magnetick Motive Virtue, whoſe Power may be continued to the fartheſt Planets.

Secondly. If the Moon, according to common Philoſophy, may move the Sea, why then may not the Sun move this Globe of Earth?

In ſuch Queries as theſe, we can conclude only from Conjectures, that Speech of the Wiſe Man, *Eccleſ.* 3. 11. being more eſpecially verified of Aſtronomical Queſtions, concerning the Frame of the whole Univerſe, *That no Man can find out the Works of God,*

God, from the beginning to the end. Though we may discern divers things in the World, which may argue the infinite Wisdom and Power of the Author; yet there will be always some Particulars left for our dispute and enquiry, and we shall never be able, with all our industry, to attain a perfect comprehension of the Creatures, or to find them wholly out, *from the beginning to the end.*

The Providence of God having thus contrived it, that so Man might look for another Life after this, when all his longing and thirst shall be fully satisfied. For since no natural Appetite is in vain, it must necessarily follow, that there is a possibility of attaining so much knowledg, as shall be commensurate unto those desires; which because it is not to be had in this World, it will behove us then to expect and provide for another. *Vallef. Sacr. Philos. c. 64.*

PROP. X.

That this Hypotheſis is exactly agreeable to common appearances.

IT hath been already proved, that the Earth is capable of ſuch a ſcituation and motion, as this Opinion ſuppoſes it to have. It remains, that in the laſt place, we ſhew how agreeable this would be unto thoſe ordinary ſeaſons of Days, Months, Years, and all other appearances in the Heavens.

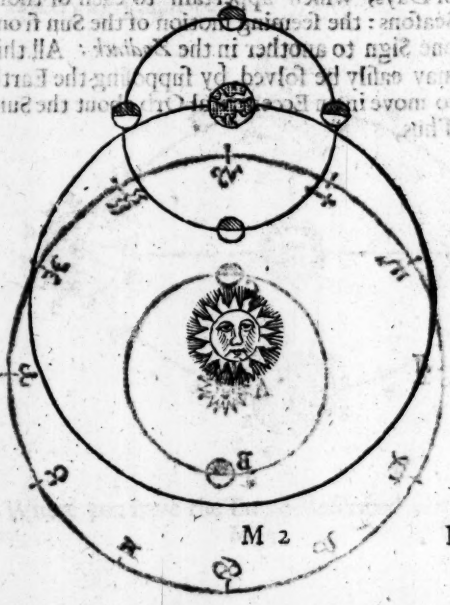
As for the difference betwixt Days and Nights: 'tis evident, That this may be cauſed as well by the Revolution of the Earth, as the Motion of the Sun; ſince the Heavenly Bodies muſt needs ſeem after the ſame manner to Riſe and Set, whether or no they themſelves by their own Motion do paſs by our *Horizon* and *Vertical* Point; or whether our *Horizon* and *Vertical* Point, by the Revolution of our Earth, do paſs by them. According to that of * *Ariſtotle*, ἐδὲν διάφερει κινεῖν τὴν ὄψιν ἢ τὸ ὁρώμενον. There will not appear any difference, whether or no the Eye be moved from the Object, or the Object from the Eye. And therefore I cannot chuſe but wonder that a Man of any Reaſon

* *De Cælo*, lib. 2. c. 8.

or

or Sence should make choice of no better an Argument to conclude his Book withal, than that which we reade at the latter end of *Al. Roff.* where he infers, that the Earth does not move, because then the shadow in a Sun-Dial would not be altered.

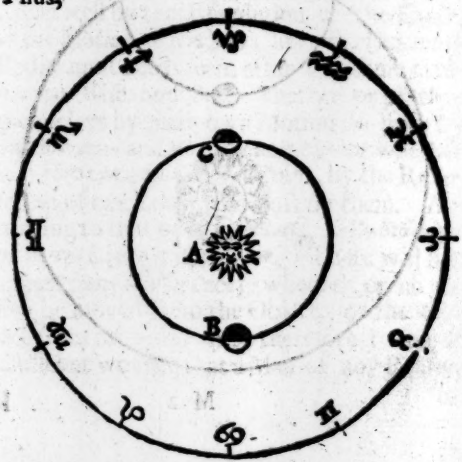
2. As for the difference of Months, we say, That the divers Illuminations of the Moon, the different bigness of her Body, her remaining for a longer or shorter time in the Earth's shadow, when she is eclipsed, *&c.* may well enough be solved by supposing her to move above our Earth, in an Eccentrical Epicycle. Thus,



M 2 In

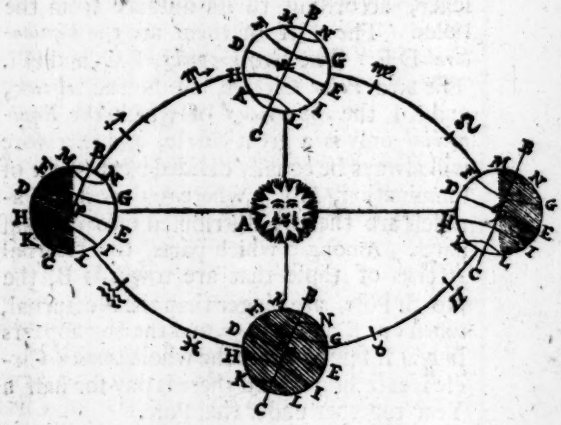
In which kind of *Hypothesis* there will be a double difference of Motion. The one caused by the different scituation of the Moon's Body in its own Eccentrick. The other by the different scituation of the Moons Orb in the Earth's Eccentrick: which is so exactly answerable to the Motions and Appearances of this Planet, that from hence *Lansbergius* draws an Argument for this *System* of the Heavens, which in the strength of his confidence he calls, *Demonstrationem* ἐπιστημονικὴν, *cui nullâ ratione potest contradici.*

4. As for the difference betwixt Winter and Summer; betwixt the number and length of Days, which appertain to each of those Seasons: the seeming motion of the Sun from one Sign to another in the *Zodiack*: All this may easily be solved, by supposing the Earth to move in an Eccentrical Orb about the Sun. Thus,



Suppoſe the Earth to be at C, then the Sun at A, will ſeem to be in the Sign ♎, and at the greateſt diſtance from us, becauſe the Earth is then in the fartheſt parts of its *Eccentrick*. When after, by its Annual Motion, it hath paſſed ſucceſſively by the Signs ♒ ♓ ♈ ♉ ♊, at length it comes to the other *Solſtice* at B, where the Sun will appear in ♑, and ſeem biggeſt, as being in its *Perigie*, becauſe our Earth is then in the neareſt part of its *Eccentrick*.

As for all other Appearances of the Sun, which concern the Annual Motion, you may ſee by the following Figure, that they are exactly agreeable to this *Hypotheſis*.



Where you have the Earth deſcribed about

the Sun at A, in the four chief Points of the *Zodiack*, namely, the two *Equinoctials* at ♈ and ♎, and the *Solstices* at ♑ and ♋. Through all which Points, the Earth does pass in its Annual Motion, from West to East.

The *Axis*, upon which our Earth does move, is represented by the Line B C; which *Axis* does always decline from that of the *Ecliptick*, about 23 degres, 30 minutes. The Points B C, are imagined to be the Poles, B the North Pole, and C the South.

Now if we suppose this Earth to turn about its own *Axis*, by a Diurnal Motion, then every Point of it will describe a Parallel Circle, which will be either bigger or lesser, according to its distance from the Poles. The chief of them are the *Equinoctial* D E. The two *Tropicks*, F G, and H I. The two *Polar* Circles, M N the *Artick*, and K L the *Antartick*: of which, the *Equinoctial* only is a great Circle, and therefore will always be equally divided by the Line of Illumination, M L; whereas the other Parallels are thereby distributed into unequal parts. Amongst which parts, the Diurnal Arches of those that are towards B, the North Pole, are bigger than the Nocturnal, when our Earth is in ♈, and the Sun appears in ♎. Insomuch, that the whole *Artick* Circle is enlightned, and there is day for half a Year together under that Pole.

Now when the Earth proceeds to the other *Solstice* at ♎, and the Sun appears in ♈, then that

that *Hemiſphere* muſt be involved in darkneſs, which did before partake of Light. And thoſe Parallels towards the North and South Poles, will ſtill be divided by the ſame inequality. But thoſe bigger parts, which were before enlightned, will now be darkned, *& vice verſa*. As when the Earth was in N, the *Artick* Circle M N was wholly enlightned, and the *Antiartick* K L altogether in the dark. So now, when it is in A, the *Antartick* K L, will be wholly in the Light, and the other M N, altogether obſcured. Whereas the Sun before was vertical to the Inhabitants at the *Tropick* F G. So now is he in the ſame ſcituation to thoſe that live under the other *Tropick* H I. And whereas before the Pole did incline 23 degrees 30 minutes towards the Sun, ſo now does it recline as much from him. The whole difference will amount to 47 degrees, which is the diſtance of one *Tropick* from the other.

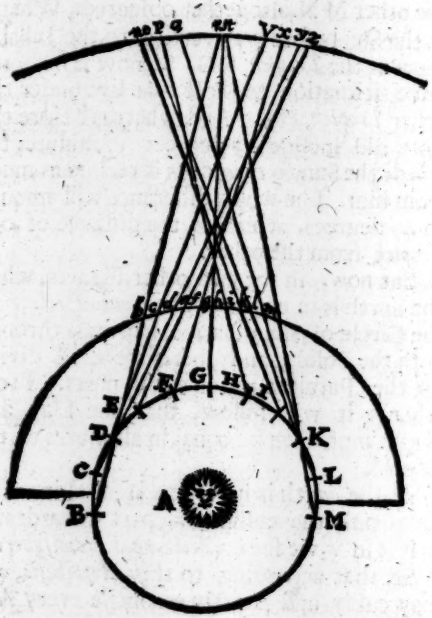
But now, in the two other Figures, when the Earth is in either of the *Equinoctials* ♈ ♎, the Circle of Illumination will paſs through both the Poles; and therefore muſt divide all the Parallels into equal parts. From whence it will follow, that the Day and Night muſt then be equal in all places of the World.

As the Earth is here repreſented in ♎, it turns only the enlightned part towards us; as it is in ♈, we ſee its *Nocturnal Hemiſphere*.

So that according to this *Hypotheſis*, we may eaſily and exactly reconcile every Ap-

pearance concerning the difference betwixt Days and Nights, Winter and Summer, together with all those other varieties which depend upon them.

If you would know how the Planets (according to the *Systeme* of the Heavens) will appear *Direct*, *Stationary*, *Retrograde*; and yet still move regularly about their own Centres, you may plainly discern it by this following *Diagram*.



Where

Where ſuppoſe the Sun to be at A, the Circle (B G M) to be the Orb of the Earth's Motion; and that above it, noted with the ſame Letters, to be the Sphere of *Jupiter*; and the uppermoſt of all, to be a part of the *Zodiack* in the Starry Heaven.

Now if you conceive the Letters, B C D E F G H I K L M, and a b c d e f g h i k l m, to divide the Earth's Orb, and that of *Jupiter*, into ſeveral parts, proportionable to the ſlowneſs or ſwiftneſs of their different motions, (*Jupiter* finiſhing his Courſe in twelve Years, and the Earth in One) then ſuppoſing the Earth to be at the Point (B), and *Jupiter* likewiſe in his Orb to be ſcituated at (b), he will appear unto us to be in the *Zodiack* at the point (r). But afterwards, both of them moving forward to the Letter (C c), *Jupiter* will ſeem to be in the *Zodiack* at (v), as having paſſed directly forward according to the order of the Signs. And ſo likewiſe each of them being tranſferred to the places (D d) (E e), *Jupiter* will ſtill appear *Direct*, and to have moved in the *Zodiack* unto the Points (y z). But now vvhen the Earth comes to be more immediatly interpoſed betwixt this Planet and the Sun; as vvhen both of them are at the Letter (F f), then vvill *Jupiter* be diſcerned in the *Zodiack* at (x). So that all the vvhile the Earth vvas paſſing the Arch (E F), *Jupiter* did ſtill remain betwixt the Points (z) and (x), and therefore muſt ſeem unto us as if he vvere *Stationary*; but after-

afterwards, both of them being carried to (G g), then *Jupiter* will appear at (s), as if by a hasty motion he had returned from his former Course the ſpace (x s): Both of them paſſing to (h h), this Planet will ſtill ſeem to be ſwiftly *Retrograde*, and appear in the Point at (p); but when they come to the Points (I i), *Jupiter* will then ſeem to be ſlower in this Motion, and to have only paſſed the ſpace (p n). Both of them being transferred to (K k), *Jupiter* will then appear in the *Zodiack* at (o), as being again *Direct*, going forward according to the order of the Signs; and while the Earth did paſs the Arch (I K), *Jupiter* then remain'd between the Points (n o), and ſo conſequently, did again ſeem to be *Stationary*. Both of them coming to (L l), and thence to (M m), *Jupiter* will ſtill appear *Direct*, and to have gone forward in the *Zodiack* from (q) to (t). So that all the ſpace wherein *Jupiter* is *Retrograde*, is repreſented by the Arch (n z). In which ſpace, he himſelf moves in his own Orb, the Arch (e i), and ſo the Earth in its Orb, a proportional ſpace (E I).

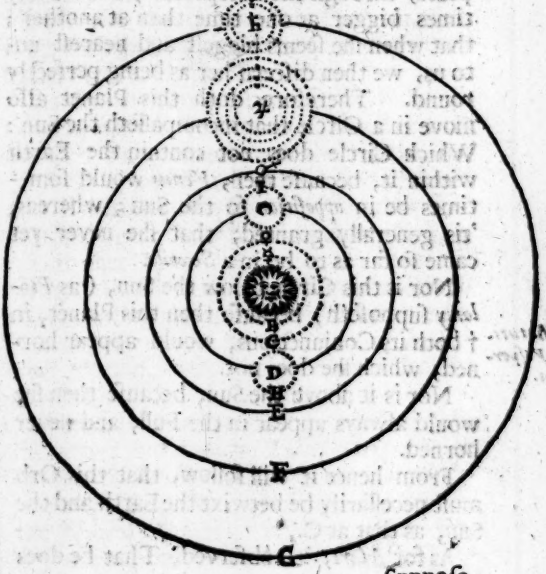
As it hath been ſaid of this Planet, ſo likewiſe is it appliable to the other. *Saturn*, *Mars*, *Venus*, *Mercury*; all which are thus made to appear *direct*, *ſtationary*, and *retrograde*, by the motion of our Earth, without the help of thoſe *Epycicles* and *Eccentricks*, and ſuch unneceſſary Wheel-work, wherewith *Ptolomy* hath filled the Heavens.

In-

Insomuch that here * *Fromondus* is fain to confess, *Nullo Argumento in speciem probabiliori, motum terræ annuum, a Copernicanis astrui, quam illo stationis, directionis, regressionis Planitarum.* There is not any more probable Argument to prove the Annual Motion of the Earth, than its agreeableness to the *station*, *direction*, and *regression* of the Planets.

* *Antarist. cap.* 18. *Vest. tract.* 4. *cap.* 3.

Lastly, That *Copernicus*'s *Systeme* of the Heavens, is very answerable to the exactest Observations, may be manifest from this following description of it.



Suppose

Suppose the Sun to be scituated at A: Now because *Mercury* is found by experience to be always very near the Sun, so that he does for the most part lie hid under his Rays. As also because this Planet hath a more lively vigorous Light than any of the other; therefore we may infer, that his Orb is placed next unto the Sun, as that at B.

As for *Venus*, 'tis observed, That She does always keep at a set distance from the Sun, never going from him above forty degrees, or thereabouts; that her Body appears, through the Perspective, to be forty times bigger at one time than at another; that when she seems biggest and neareſt unto us, we then discern her as being perfectly round. Therefore doth this Planet also move in a Circle that incompasseth the Sun: Which Circle does not contain the Earth within it, because then, *Venus* would sometimes be in *opposition* to the Sun; whereas, 'tis generally granted, that she never yet came so far as to be in a *Sextile*.

Nor is this Circle below the Sun, (as *Ptolomy* supposeth) because then this Planet, in † both its Conjunctions, would appear horned, which she does not.

† *Matutina, Vespertina.*

Nor is it above the Sun, because then she would always appear in the Full, and never horned.

From hence it will follow, that this Orb must necessarily be betwixt the Earth and the Sun, as that at C.

As for *Mars*, 'tis observed, That he does appear

appear ſixty times bigger when he is near us, than at his greateſt diſtance; that he is ſometimes in *oppoſition* to the Sun. From whence we may conclude, that his Orb does contain our Earth within it. 'Tis obſerved alſo, that he does conſtantly appear in the Full, and never horned; from whence likewiſe it is manifeſt, that the Sun is comprehended within its Orb, as it is in that which is repreſented by the Circle E.

And becauſe the like appearances are obſerved in *Jupiter* and *Saturn*, (though in leſs degrees) therefore we may with good reaſon conceive them to be in the Heavens, after ſome ſuch manner as they are here ſet down in the Figure, by the Circles F G.

As for the Moon; becauſe ſhe is ſometimes in *oppoſition* to the Sun; therefore muſt her Orb comprehend in it the Earth; becauſe ſhe appears dark in her Conjunction, and ſometimes eclipſes the Sun, therefore that muſt neceſſarily be without her Orb, as it is in that *Epicycle* at H. In the Centre of which, the Earth muſt neceſſarily be ſituated according to all thoſe appearances mentioned before. So that the Orb of its annual Motion, will be repreſented by the Circle D.

All which appearances, cannot ſo well be reconciled by *Ptolomy*, *Tycho*, *Origanus*, or by any other *Hypotheſis*, as by this of *Copernicus*. But the application of theſe to the ſeveral Planets, together with ſundry other particulars, concerning the *Theorical*

rical part of *Astronomy*, you may see more fully set down by those who have purposely handled this Subject, *Copernicus*, *Rheticus*, *Galileus*; but more especially *Keplar*, unto whom I do acknowledg my self indebted for sundry Particulars in this Discourse.

I have done with that which was the chief purpose of the present Treatise; namely, the removal of those common Prejudices that Men usually entertain against this Opinion. It remains, that by way of Conclusion, I endeavour to stir up others unto these kind of Studies, which by most Men are so much neglected.

'Tis the most rational way, in the prosecution of several Objects, to proportion our love and endeavour after every thing, according to the excellency and desireableness of it. But now, amongst all Earthly Contentments, there is nothing either better in it self, or more convenient for us, than this kind of Learning; and that, whether you consider it according to its *general* Nature, as a *Science*; or according to its more *special* Nature, as *such* a *Science*.

1. Consider it as a *Science*. Certain it is, that amongst the variety of Objects, those are more eligible, which conduce unto the welfare of that which is our best part, our Souls. 'Tis not so much the pleasing of our Senses, or the increasing of our Fortunes, that does deserve our industry, as the information of our Judgments, the improvement of our Knowledg. Whatever the

the World may think, yet it is not a vast Estate, a Noble Birth, an eminent place, that can add any thing to our true real Worth; but it must be the degrees of that which makes us *Men*, that must make us *better Men*, the endowments of our Soul, the enlargement of our Reason. Were it not for the contemplation of Philosophy, the Heathen * *Seneca* would not so much as thank the Gods for his Being; *Nisi ad hæc admitterer non fuisse operæ pretium nasci. Detrahe hoc inæstimabile bonum, non est vita tanti, ut sudem, ut æstuem.* Take but away this benefit, and he would not think Life worth the sweating for. So much happiness could he discern in the Studies of Nature. And therefore as a *Science* in general, it may very well deserve our Love and Industry.

* *Præf. ad lib. 1. Nat. Quæst.*

2. Consider it as such a particular *Science*, *Astronomy*: The word signifies, the Law of the Stars; and the Hebrews (who do not ordinarily admit of composition) call it, in two words, חקות שמים, *Cœlorum statuta*, or the *Ordinances of Heaven*; because they are governed in their Courses by a certain Rule, as the *Psalmist* speaks, in *Psal.* 148. 6. *God has given them a Law which shall not be broken.*

Job 38. 33. Jer. 33. 25.

Now this, of all other natural *Sciences*, may best of all challenge our Industry; and that, whether you consider it,

1. Absolutely, as it is in it self: Or,
2. As it stands in reference to us.

1. As

1. As it is in it self. The excellency of any *Science* may be judged of (saith the Philosopher) first, by the excellency of the Object. Secondly, By the certainty of its Demonstrations.

(1.) For the *Object*. It is no less than the whole World (since our Earth also is one of the Planets) more especially those vast and glorious Bodies of the Heavens. So that in this respect, it far exceeds all those barren, empty Speculations, about *Materia Prima*, or *Universale*, and such-like Cobwebs of Learning; in the study of which, so many do misplace their younger Years. And for the same reason likewise is it to be preferr'd before all those other *Sciences*, whose Subjects are not either of so wide an extent, or so excellent a Nature.

(2.) From the *Demonstrations* of *Astronomy*, they are as infallible as Truth it self; and for this reason also does it excel all other Knowledg, which does more depend upon Conjectures and Uncertainty. They are only those who want skill in the Principles of this *Science*, that mistrust the Conclusions of it. Since therefore in these respects, it is one of the most excellent *Sciences* in Nature, it may best deserve the industry of Man, who is one of the best Works of Nature. Other Creatures were made with their Heads and Eyes turned downwards: Would you know why Man was not created so too? Why it was, that he might be an Astronomer.

Or

Os homini sublime dedit, Cœlumq; tueri
Jussit, & erectos ad Sydera tollere vultus.

God gave to Man an upright Face, that he
Might view the Stars, and learn Astronomy.

2. Consider it in reference to us, and so it is;

1. Most Useful.
2. Most Pleasant.

1. Most Useful, and that in sundry respects. It proves a God and a Providence, and incites our Hearts to a greater admiration and fear of his Omnipotency. *We may understand by the Heavens, how much mightier he is that made them; for by the greatness and beauty of the Creatures, proportionably the Maker of them is seen*, saith the Book of *Wisdom*, Ch. 13.4,5. 'Twas hence *Aristotle* fetch'd his chief Argument to prove a *primus Motor*. 'Twas the consideration of these things that first led Men to the Knowledg and Worship of God, (saith * *Tully*); *Hæc nos primum ad Deorum cultum, tum ad modestiam, magnitudinemq; animi erudivit.* And therefore when God by the Prophet, would convince the People of his Deity, he bids them *lift up their Eyes on high; and behold who hath created those things, that bringeth out their Host by Number, that calleth them all by their Names*, &c. *Isa.*40.26. Which occasioned that saying of *Lactantius*; *Tanta rerum magnitudo, tanta dispositio, tanta in servandis ordinibus, temporibusq; constantia,*

* Tuscul. 1 *Item* Plut. *de Placit.* Phil. *l.* 1. *c* 6.

Instit. l. 2. *c.*5.

non potuit aut olim sine provida artifice oriri, aut constare vel saeculis sine incola potente, aut perpetuum gubernari sine perito & sciente rectore, quod ratio ipsa declarat. Such a great order and constancy amongst those vast Bodies, could not at first be made, but by a wise Providence, nor since preserved without a powerful Inhabitant, nor so perpetually governed without a skilful Guide.

True indeed, an ordinary view, and common apprehension of these Celestial Bodies, must needs manifest the Excellency and Omnipotency of their Maker; but yet a more accurate and diligent enquiry into their Natures, will raise our Understandings unto a nearer Knowledg, and greater Admiration of the Deity. As it is in those inferior things, where the meer out-side of a Man, the comelines and majesty of his Countenance, may be some Argument from whence to infer the excellency of his Creator. But yet the subtil Anatomist, who searches more deeply into this wonderful Structure, may see a clearer evidence for this, in the consideration of the inward Fabrick, the Muscles, Nerves, Membranes; together with all those secret Contrivances in the Frame of this little World. Thus also is it in the great *Universe*, where the common apprehension of things is not at all considerable, in comparison to those other Discoveries, which may be found out by a more exact enquiry.

As this Knowledg may conduce to the proving

praying of a God, and making Men religious; so likewise may it serve to confirm unto us the Truth of the Holy Scriptures; since the Sacred Story, in the order of its Narrations, does so exactly agree with the Conversions of Heaven, and *Logistical Astronomy*.

It may also stir us up to behave our selves answerably, unto the noble and divine Nature of our Souls. *When I consider the Heaven, the Works of thy Fingers; the Moon and the Stars which thou hast ordained. What is Man, that thou art so mindful of him?* Psalm. 8. 3, 4. as to create such vast glorious Bodies for his Service.

Again, when I consider with my self, the strange immensity and bigness of this great *Universe*, in comparison to which this Earth of ours, is but as an undiscernable Point: When I consider that I carry a Soul about me, of a far greater worth than all this, and Desires that are of a wider extent, and more unbounded capacity, than this whole Frame of Nature; then me-thinks it must needs argue a degenerateness and poverty of Spirit, to busy my Faculties about so ignoble, narrow a subject, as any of these earthly things.

What a folly is it in Men to have such high conceits of themselves, for some small Possessions which they have in the World above others, to keep so great a bustle about so poor a Matter. *Hoc est punctum quod*

Sen. Nat. Quæſt. l. 1. Nonne è terræ animalia conſideranti, quibus præſidere videamini? Nam ſi inter mures videres unum alterumve, ſibi ac poteſtatem præcæteris vindicantem, quanto moveris cachinno, &c.

quod inter vos gentes ferro & igni dividitur. 'Tis but a little Point, which with ſo much adoo is diſtributed unto ſo many Nations by Fire and Sword. What great matter is it to be a Monarch of a ſmall part of a Point? Might not the Ants as well divide a little Mole-hill into divers Provinces, and keep as great a ſtir in diſpoſing of their Government? *Punctum eſt illud in quo Navigatis, in quo Bellatis, in quo Regna diſponitis.* All this place wherein we War, and Travel, and diſpoſe of Kingdoms, is but a Point far leſs than any of thoſe ſmall Stars, that at this diſtance are ſcarce diſcernable. Which when the Soul does ſeriouſly meditate upon, it will begin to deſpiſe the narrowneſs of its preſent Habitation, and think of providing for it ſelf a Manſion in thoſe wider Spaces above, ſuch as may be more agreeable to the Nobleneſs and Divinity of its Nature.

Boëtius de Conſol. l. 2.

Why ſhould any one dream of propagating his Name, or ſpreading his Report through the World? when as though he had more Glory than Ambition can hope for; yet as long as all this habitable Earth is but an inconſiderable Point, what great matter can there be in that Fame which is included within ſuch ſtrait contracted Limits?

Boëtius Ibid.

Quicunq; ſolam mentis præcipiti petit
Summumq; credit gloriam,
Late patentes æthere cernat plagas,
Arctumq; terrarum ſitum.

Brevem

Brevem replere non valentis ambitum,
Pudebit aucti nominis.

He that to Honour only seeks to mount,
And that his chiefest end doth count;
Let him behold the largeness of the Skies,
And on the strait Earth cast his Eyes;
He will despise the glory of his Name,
Which cannot fill so small a Frame.

Why should any one be taken up in the admiration of these lower out-sides, these earthly Glories? *Respicite Cœli spatium, firmitudinem, celeritatem, & aliquando desinite vilia mirari.* He that rightly understands the Nature of the Heavens, will scarce esteem any other thing worth his *notice*, much less his *wonder*. *Idem l. 3.*

Now when we lay all this together, that he who hath most in the World, hath almost nothing of it; That the Earth it self, in comparison to the *Universe*, is but an inconsiderable Point: And yet that this whole *Universe* does not bear so great proportion to the Soul of Man, as the Earth does unto that: I say, when a Man, in some retired thoughts, shall lay all this together, it must needs stir up his Spirits to a contempt of these earthly Things, and make him place his love, and endeavour upon those Comforts that may be more answerable to the excellency of his Nature.

Without this *Science*, what Traffick could we have with Forreign Nations? What would

would become of that mutual Commerce, whereby the World is now made but as one Common-wealth.

Vosq; mediis in aquis Stellæ, pelagoq; timendo,
Decretum monstratis iter, totiq; dedistis,
Legibus inventis hominum, commercia mundo.

'Tis you bright Stars, that in the fearful Sea
Does guide the Pilot through his purpos'd way.
'Tis your direction that doth Commerce give,
With all those Men that thro' the World do live.

2. As this Science is thus profitable in these and many other respects: so likewise is it equally pleasant. The Eye (saith the Philosopher) is the sense of Pleasure, and there are no delights so pure and immaterial, as those which enter through that Organ. Now to the Understanding, which is the Eye of the Soul, there cannot be any fairer prospect, than to view the whole *Frame* of Nature, the Fabrick of this great *Universe*, to discern that order and comeliness which there is in the *magnitude*, *situation*, *motion* of the several parts that belong unto it; to see the true cause of that constant variety and alteration which there is in the different Seasons of the Year. All which must needs enter into a Man's thoughts, with a great deal of sweetness and complacency. And therefore it was that *Julius Cæsar*, in the Broils and Tumult of the Camp, made choice of his delight:

Wisd. 7. 18, 19.

Media

——Media inter prælia semper,
Stellarum, Cœliq; plagis, superisq; vacavit. Lucan. l. 10.

He always leisure found, amidst his Wars,
To mark the Coasts of Heav'n, & learn the stars.

And for this reason likewise did *Seneca*, amidst the continual noise and bussle of the Court, betake himself to this Recreation:

O quam juvabat, quo nihil majus, parens
Natura genuit, operis immensi artifex,
Cœlum intueri Solis, & currus sacros
Mundiq; motus, Solis alternas vices,
Orbemq; Phœbes, Astra quem cingunt vaga
Lateq; fulgens atheris magni decus.

O what a pleasure was it to survay
Natures chief Work, the Heavens; where we may
View the alternate Courses of the Sun,
The sacred Chariots, how the World does run;
The Moons bright Orb, when she's attended by
Those scattered stars, whose light adorns the Sky.

And certainly those eminent Men, who have this way bestowed a great part of their imploiment, such as were *Ptolomy*, *Julius Cæsar*, *Alphonsus* King of *Spain*, the Noble *Tycho*, &c. have not only by this means pitched upon that which for the present was a more solid kind of pleasure and contentment, but also a surer way to propagate their memories unto future Ages. Those great costly

Pyra-

Pyramids which were built to perpetuate the memory of their Founders, shall sooner perish and moulder away into their Primitive Dust, than the Names of such Worthies shall be forgotten. The Monuments of Learning are more durable than the Monuments of Wealth or Power.

All which Encouragements may be abundantly enough to stir up any considering Man, to bestow some part of his time in the study and inquisition of these Truths.

Fœlices animæ, quibus hæc cognoscere primum,
Inq; domos superas scandere cura fuit.

FINIS.

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